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**Capabilities, Policy and Institutions in the Emergence of  
Venture Capital in the UK and US**

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DPhil Thesis

University of Sussex

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I hereby declare that this thesis has not been submitted either in the same or different form to this or any other university for a degree.

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## **Abstract**

Venture capital (VC) is widely perceived by UK policymakers to be a key requirement for the growth and development of successful and innovative early stage firms. This thesis examines how government policy has impacted the emergence of VC sectors in the UK and US. Using historical, qualitative and quantitative methods it argues that the public rationale behind UK policy has been largely framed in ways that underestimate the importance of capabilities, demand for capital, and institutional differences.

The thesis examines venture capitalists' key supply-demand relationships: with funded firms; with limited partners; and with the markets that allow exit via IPO. It argues that the US VC sector has developed unique capabilities enabling the assembly of complementary assets to bring firms to successful IPO. In the UK, policy aimed at addressing the 'equity gap' has focused on the provision of capital rather than developing the capabilities that have characterised the US sector. We perform quantitative analysis examining the effectiveness of recent UK schemes at providing VC funding to small firms. Drawing upon two proprietary datasets, including one new hand-collected dataset of all investments made under the Venture Capital Trust scheme, the thesis provides new quantitative evidence on the success of government policy interventions, demand for capital by firms, and investment exit opportunities.

The thesis then compares principal-agent and evolutionary framing perspectives of the VC sector, arguing the evolutionary view explains some nuances more readily than a pure principal-agent view. It concludes by discussing the theoretical and policy implications of the research.

## Table of Contents

Chapter 1: Introduction.....	1
1.1 Purpose of the research.....	1
1.2 Line of argument .....	3
1.3 Data .....	6
1.4 Organisation and structure of thesis .....	7
1.5 Contribution to the innovation and technology policy literature.....	9
1.6 Conclusion and summary .....	10
Chapter 2: Venture Capital, Policy and Theory: An Initial Framework.....	11
2.1 Introduction .....	11
2.2 Venture capital and its role in small firms .....	11
2.3 Venture capital, its role, and its key relationships: .....	16
2.4 Policy and national performance of VC sectors .....	23
2.5 Economic perspectives and venture capital: Principal-agent and evolutionary views.....	28
2.6 Framing the thesis research.....	35
2.7 Conclusion .....	40
Chapter 3: Operationalising the Research Framework.....	42
3.1 Introduction .....	42
3.2 Research design and method .....	42
3.3 Case selection and the venture capital sectors of the US and UK.....	47
3.4 Operationalising hypotheses and data collection.....	50
3.5 Conclusion .....	54
Chapter 4: The Emergence of the US Venture Capital Sector: Toward a Capabilities Explanation.....	55
4.1 Introduction .....	55
4.2 The US venture capital sector: A brief history.....	55
4.3 Networks as drivers of demand for capital .....	63
4.4 US government involvement in the emergence of the VC sector .....	66
4.5 Institutional factors and markets for exit in the US.....	71
4.6 Conclusion .....	77
Chapter 5: Beyond the Macmillan Gap: Perspectives on the Emergence of the UK Venture Capital Sector .....	79
5.1 Introduction .....	79
5.2 The 'equity gap' as a boundary object.....	80
5.3 The emergence of the UK venture capital sector: A capabilities-based interpretation .....	104
5.4 Opportunities for exit for UK VC investments.....	110
5.5 Supply-demand relationships, exits and capabilities in the UK VC sector .....	117
5.6 Conclusion .....	121
Chapter 6: An Evaluation of the Effectiveness of Government-Backed Interventions for SME Finance .....	124
6.1 Introduction .....	124
6.2 VCTs and post-1998 schemes: Selection, characteristics and relevant empirical literature.....	125
6.3 Framing and method for quantitative analysis.....	133
6.4 Construction and descriptive variables for the datasets.....	139

6.5	<i>Research question I: Effectiveness of interventions with different structures .....</i>	150
6.6	<i>Research question II: An initial exploration of demand for capital .....</i>	154
6.7	<i>Research question III: Characteristics of investment exit.....</i>	158
6.8	<i>Research question IV: Differentiation of capabilities in equity investments.</i>	163
6.9	<i>Summary and conclusion .....</i>	164
	Chapter 7: Analysis and Conclusion.....	166
7.1	<i>Introduction .....</i>	166
7.2	<i>Summary of the thesis .....</i>	167
7.3	<i>Framing theories and policy: Different interpretations of the case of venture capital .....</i>	173
7.4	<i>Gerschenkron and the role of comparative history in policymaking: Toward an evolutionary theory of policy.....</i>	181
7.5	<i>Policy implications.....</i>	185
7.6	<i>Limitations and potential for future research .....</i>	188
7.7	<i>Contributions and conclusion.....</i>	190
	Bibliography.....	192

## List of Tables

Table 2.5.1 Principal agent vs. evolutionary and capabilities views of organisations (adapted from Dosi and Marengo 2007 p. 494).....	34
Table 2.6.1 Principal agent and evolutionary and capabilities explanations of venture capital.....	39
Table 6.2.1 – Changes in the VCT scheme, 1995-2009 .....	127
Table 6.4.2 Descriptive data for the VCT dataset.....	143
Table 6.4.1 VCT Investment Type by Year .....	145
Table 6.4.4 Investments made by government-backed schemes in the post-1998 dataset.....	147
Table 6.4.5 Mean values for binary variables in post-1998 dataset.....	148
Table 6.4.6 Descriptive data for combined dataset.....	150
Table 6.5.1 Logit regression for government scheme and investment type .....	152
Table 6.6.1 IRR in Sectors and Years of Investment <b>Error! Bookmark not defined.</b>	
Table 6.6.2 Annual VCT Investments in Early Stage Firms by Sector ..... <b>Error!</b> <b>Bookmark not defined.</b>	
Table 6.7.1 All exits from venture capital trusts .....	158
Table 6.7.2 Exits from VCT investments in originally unlisted firms.....	159
Table 6.7.3 Exits by type for government-backed schemes .....	159
Table 6.7.4 Likelihood of Investments Reaching Exit .....	162



**Abbreviations of terms used**

AIM	Alternative Investment Market (UK)
AR&D	American Research and Development (US)
ATP	Advanced Technology Program (US)
BERR	Department of Business, Enterprise and Regulatory Reform (UK)
BIMBO	Buy-in management buy-out
BVCA	British Venture Capital Association
DEC	Digital Equipment Corporation
DTI	Department of Trade and Industry (UK)
ECF	Enterprise Capital Fund (UK)
EGF	Early Growth Fund (UK)
EIS	Enterprise Investment Scheme (UK)
ERISA	Employee Retirement Income Security Act of 1974 (US)
GP	General partner
HMRC	HM Revenue and Customs
HMT	HM Treasury
ICB	Industry Classification Benchmark
IIF	Innovation Investment Fund (Australia)
IPO	Initial public offering
IRR	Internal rate of return
LGS	Loan Guarantee Scheme (UK)
LP	Limited partner
LSE	London Stock Exchange
LSVCC	Labour-Sponsored Venture Capital Company (Canada)
MBI	Management buy-in
MBO	Management buy-out
SBA	Small Business Administration (US)
SBIC	Small Business Investment Company (US)
SBIR	Small Business Innovation Research (US)
SIC	Standard Industry Classification
VC	Venture capital
VCs	Venture capitalists
VCT	Venture Capital Trust (UK)

## **Chapter 1: Introduction**

### *1.1 Purpose of the research*

This thesis explores the role of policy in the emergence of the venture capital sectors of the US and UK. Venture capital, despite its relatively recent genesis, has backed many of the most successful new technology-based firms coming from the US over the past 50-60 years. Intel, Apple, Genentech, Federal Express, Yahoo, Google, Facebook and many more success stories have been backed by venture capital (VC) at some point in their growth. Such has been the impact of the venture capital sector that in 2000, the 2180 firms that had received VC in their existence made up “20% of all public companies in the US, 11% of sales... and one-third of total market value, in excess of \$2.7 trillion” (Shane 2008 p. 162). Out of the millions of firms created in the US each year, the VC sector invests in an average of 820 firms annually (ibid). In this way it is clear that venture capital’s impact has been disproportionate.

VC investment is, at its core, based on a simple trade-off. Often the most innovative small firms are those that have few assets but require significant amounts of capital to grow. However with little track record and high operating costs, there is little information about the firm and its risk profile. Consequently the risks associated with investment in these small firms become much higher in the absence of quality information. These firms may lack collateral as well, making them unfavourable investments for banks. Venture capitalists (VCs) fill this gap by making equity investments in the firms, providing the capital the firm needs to grow in exchange for a share of the ownership. The provision of investment in return for equity is far from new; investors have been supporting risky new ventures in exchange for shares of the return for centuries, if not millennia (see Michie 1981).

What differentiates the venture capital sector from its privateer forebears is its organisation and professionalization. The success of the venture capital industry has come from its ability to mediate between two groups that might otherwise never interact profitably. VC has traditionally raised funds from institutional investors such as pension funds and insurance companies, and then invested those funds in entrepreneurial ventures. By joining the wealth of the institutional investors and the innovativeness of small firms, venture capitalists are able to generate returns for investors and wealth in their national economies.

To date the nation that has received the most of this wealth generation derived by venture capital has been the US, where the sector first emerged. Given the disproportionate impact of the VC business model in the US, it is unsurprising that the venture capital business model has caught the attention of policymakers and investors worldwide. The Lisbon Treaty has sought to develop VC sectors in Europe and other policy measures have been made to develop local VC sectors around the world (see Armour and Cumming 2007). Despite some cases of success (chief among them Israel, see Avnimelech and Teubal 2006), few domestic venture capital sectors outside the US have managed to replicate the success of the US sector (Black and Gilson 1998, Jeng and Wells 2000, Armour and Cumming 2007).

This thesis examines the case of the UK, which has sought to develop its own venture capital sector, and compares it to the case of the US that it (directly or indirectly) has sought to emulate. The UK venture capital sector has generally been described as a great success (Black and Gilson 1998 p. 266), and has often been rated the largest in Europe (see BVCA 2007 p. 91), but closer examination shows that many figures relating to VC funding in the UK reflect not only early-stage investment but a range of other types of equity-based deals, such as management buy outs (MBOs). This suggests that the actual impact of the VC sector, in terms of supporting early stage firms, in the UK is significantly more limited than initial figures would suggest (European Commission 2006).

This thesis seeks to understand the differences in the role that policy has played in the emergence of the VC sectors in the US and UK. The two nations share a

common language, similar cultures, and have a similar market-based economic structure<sup>1</sup>. However, the UK VC sector has evolved in a very different way from the US and has been less successful in generating funds for early stage investment, despite ongoing and substantial public investment over the past eighty years. If the commonalities between the US and UK, and the presence of government support cannot explain the differences in the emergence of the two sectors, then a more nuanced exploration of the role of policy on the two sectors is therefore required.

The thesis therefore seeks to contribute toward policy debates about how, and to what extent, government policy has shaped the evolution of the generally successful US venture capital sector and the less successful UK sector. It does this by examining the UK government's ongoing attempts to address the understood 'equity gap' and provide capital to high-growth firms. In particular, it explores an important subsample of the UK sector - the UK venture capital trust sector. Using the VCT sector as a non-representative but 'crucial' case, it asks whether the stated or implicit framing assumptions behind policies in the UK case are empirically supported. It seeks to examine these assumptions by comparing principal-agent and evolutionary interpretations of the VC sector against the data collected in the thesis on the performance of VCTs and other government-backed equity investments.

## *1.2 Line of argument*

The thesis argues that much of the venture capital literature, and the resulting policy that informs it, has drawn implicitly or explicitly from the principal-agent or contracting perspective (see Alchian and Demsetz 1972 and Jensen and Meckling 1976) for explaining the existence and functioning of venture capital as an organisational form. However it suggests that this is not the only theoretical perspective that might inform understanding of the VC sector, and that an evolutionary or capabilities perspective (reflecting in some ways what Dosi et al (2006 p. 1450) refers to as the 'Stanford-Yale-Sussex synthesis', a school of

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<sup>1</sup> The commonalities are such that the US and UK economies are widely referred to collectively as representative of the 'Anglo-Saxon' model of capitalism (see Albert 1991 and Hall and Soskice 2001 for an expanded discussion of this proposed model).

thought following Nelson and Winter 1982, and here incorporating work on dynamic capabilities including Teece and Pisano 1994 and Eisenhardt and Martin 2000) might add additional insights about VC that a principal-agent perspective can itself not suitably explain. The research question therefore seeks to provide an empirical comparison of the role of policy in the emergence of the VC sectors of the US and UK, and a theoretical comparison of the strengths and weaknesses of principal-agent and evolutionary approaches in explaining the empirical data collected.

The thesis argues that the US government has played a significant and underappreciated role in developing the US VC sector, less by directly intervening in the market for small firm finance but by more often by indirectly increasing the supply of capital for small firms (for instance via the ERISA rules change) and the demand for capital (by providing extensive support for R&D in small firms). In this setting the US VC sector has developed capabilities to exploit the institutional factors (such as the federal system (Bush 2005) and the NASDAQ market (Ingebretsen 2002)) present in the US. The dynamic capabilities (defined in this thesis in line with Eisenhardt and Martin 2000) developed in the US sector include the ability to take advantage of their positions in networks; and their ability to assemble complementary assets to build firms that may then be exited via IPO.

This is contrasted to the case of the UK venture capital sector, which is somewhat different from the US case in that the UK government has played an ongoing and active role in the development of the national sector. The thesis suggests that the notion of the 'equity gap', first discussed in 1931 (Macmillan Report 1931), has become a 'boundary object' (see Star and Griesemer 1989) that has come to dominate policy discussions for the past eighty years. As time has passed, the 'equity gap' has been widely accepted but has continued to mean different things to different actors, who agree that it exists but view and interpret it in vastly different ways. The discussion of the UK VC sector seeks to move beyond an 'equity gap' interpretation and instead suggests a capabilities-based explanation of the VC sector. It argues that the capabilities developed within ICFC, the first large scale policy intervention to address small firm finance, were based on financial and

accounting capabilities rather than the dynamic capabilities for the building of complementary assets seen in the US. These capabilities then informed the structure of the UK VC sector, driving the ultimate growth of the private equity sector at the expense of early stage investment. The thesis then suggests that subsequent interventions by the UK government into small firm finance have been characterised by competition among institutions such as the stock markets, the UK VC sector, and the investment trust sector for the design of policy structures to reflect their own interests. This has resulted in a system that is more heavily reliant on direct government intervention than that of the US, and a private VC sector with relatively little capacity or interest in making or developing high-growth firms.

This historical and qualitative evidence is then supplemented with quantitative evidence that draws upon a complete dataset of all investments made under the venture capital trust (VCT) scheme and several subsequent government-backed policies. The quantitative analysis provides empirical support for several policy issues identified previously as playing key roles in the development of the UK venture capital sector. These include the challenges in designing policies that provide proper incentives and reflect the level of demand for capital from firms; the role of capabilities for identifying and supporting investments in early stage firms; and the importance of venues for deriving profitable exit from investments.

The thesis then draws upon the two cases to argue that the principal agent perspective has explanatory power for some phenomena but lacks the ability to suitably explain other elements identified in this thesis as key to the emergence of VC in the US. The principal-agent view can provide a convincing explanation of the success of the US (suggesting that once market failures were addressed the market has operated efficiently), while framing the case of the UK as a case where market failure (likely in the provision of capital) has remained prevalent despite ongoing intervention. The evolutionary/capabilities framework emphasises the role of networks, government intervention and means of exit in the US, and identifies the importance of the capabilities in enabling VCs to take advantage of these features. The VC sector in the UK would be characterised by complex, analytical capabilities

(rather than the simple, unstable adaptive processes discussed by Eisenhardt and Martin 2000 and proposed as being key in the US) that are not suited to the dynamic funding and competitive environments in which small firms operate. Consequently in the absence of the capabilities for dealing with these markets, the evolutionary theory would identify the problem not as an 'equity gap' but as a gap in capabilities, networks, and means for profitable exit. At the same time the evolutionary perspective, despite its useful explanatory powers, is quite limited in its ability to directly suggest policy measures, which is something the principal agent and market failure framework is able to do quite readily. The challenge therefore is to begin to explore means of developing an evolutionary theory of policy, and the thesis concludes by making some initial steps toward addressing this issue drawing from the writings of Alexander Gerschenkron (1962, 1968). The thesis concludes by identifying some initial policy conclusions, which point to the importance of developing capacity for investment and encouraging the development of desired capabilities.

### *1.3 Data*

The thesis uses historical, quantitative and qualitative data to draw its conclusions. The discussions of the US are largely based on existing academic and professional literature and accounts. This is due to the large and prominent body of literature already in existence regarding the success and emergence of the US VC sector.

The analysis of the UK relies upon a range of sources. It draws extensively on policy documents, Parliamentary proceedings, media accounts, scholarly literature, surveys and targeted interviews. The analysis of the UK focuses on the sector as a whole and does not explicitly address regional aspects in venture funding (such as the schemes in Scotland, Wales and Northern Ireland) as part of its remit; there is some discussion of regional issues but the scope for this thesis is limited to the UK as a whole.

The thesis also includes analysis of new quantitative data comparing the success of the Venture Capital Trust, Regional Venture Capital Funds, Early Growth Funds,

University Challenge Funds, and Enterprise Capital Funds in providing funds to small early stage firms. The Venture Capital Trust (VCT) data was hand-collected for this thesis from the annual securities filings for approximately 100 VCTs, representing each fund in the sector. The data on the other funds was hand-collected from the Library House database. One formulation of this dataset was used for the analysis in Nightingale et al (2009), although the formulation of the database used in this thesis includes several cases and variables not included in that analysis.

In order to answer the research question and therefore determine how government policy has affected the emergence of the VC sectors of the US and UK, the thesis will provide historical evidence from the two cases. The US case will serve as a contextual case, against which the more in-depth analysis of the UK will be contrasted. The analysis of the UK will use historical and qualitative material to argue for the importance of demand for capital, capabilities and institutions for exit on the UK sector. These areas will then be examined using quantitative data to provide initial empirical support for these assertions. These qualitative and quantitative data will then be brought together and used to build the argument that the evolutionary perspective is able to illuminate important aspects of the emergence of the VC sector that are less easily explicable by the principal agent approach.

#### *1.4 Organisation and structure of thesis*

Chapter 2 provides a review of the literature surrounding the VC sector and VC policy, and presents a brief overview of the theoretical perspectives presented in the thesis. It outlines the theoretical framework that will inform the subsequent analysis.

Chapter 3 provides an explanation of how the research question and theoretical frameworks were operationalised for the purpose of the thesis. It discusses the selection of a multiple-case study method, and the use of mixed-method



techniques within that framework. It also discusses case selection and the execution of the research.

Chapter 4 discusses the case of the US. It adopts an approach examining three key relationships that contribute to success in the VC sector. Drawing primarily from existing literature it shows that far from being an ideal form from its beginning, venture capital as an institution has grown and evolved, taking advantage of unique institutional features of the US system and particular regions. Government involvement in the US VC sector has been significant but largely based on encouraging supply of and demand for capital, rather than direct provision of government funds to firms or VCs. It develops an argument that venture capitalists in the US may be interpreted as demonstrating a number of capabilities and dynamic capabilities that facilitate the success of venture capitalists in extracting value from their environment and assembling complementary assets into a valuable form.

Chapter 5 turns its attention to the UK. Drawing upon primary accounts, policy documents, interviews and academic literature, it discusses the emergence of the UK venture capital sector. It develops the argument that the 'equity gap' that has defined much UK small firm policy represents a boundary object that is widely acknowledged but does not share a common definition. It presents an argument for the emergence of capabilities in the UK, suggesting that the UK's VC sector has been shaped in a path-dependent manner such that many of the capabilities in the VC sector have reflected those capabilities developed in the extensive training programmes of ICFC. It discusses challenges relating both to demand for capital among firms and in finding and generating opportunities for profitable exit from investments.

Chapter 6 provides quantitative evidence in support of the conclusions drawn at the end of Chapter 5. This quantitative analysis is based upon two datasets discussing the relative success of several UK government-backed programmes in directing funds to early stage firms. It suggests that the schemes implemented after the VCT programme have been more successful in directing funds toward early

stage firms. It also provides initial data supporting the proposed capabilities-based explanation of the development of the UK VC sector in the previous chapter. Finally it also provides data addressing the nature and quality of exit opportunities in the UK, suggesting that lucrative IPOs are still generally elusive to UK firms and investors, but that there are questions about the broader demand for capital among small firms.

Chapter 7 discusses the context of the comparisons between the US and UK and links them to the framing theoretical perspectives. It discusses the strengths and weaknesses of the principal-agent and evolutionary views in explaining the empirical findings of the thesis. It proposes an initial means of addressing the weaknesses of the evolutionary perspective in generating policy, and concludes by discussing policy implications and further areas for research.

### *1.5 Contribution to the innovation and technology policy literature*

This thesis makes empirical and theoretical contributions to knowledge. It provides a historical contribution by providing an updated history of the UK VC sector, focusing on the range of factors and institutions contributing to success. Its historical contribution will fill a gap in the literature by addressing the recent policy history of the UK sector since the mid 1990s. However the primary empirical contribution is quantitative, in the form of a new, hand-collected dataset of all investments made by firms in the Venture Capital Trust sector from its creation in 1995 to 2006. This dataset, because it is based on statutory securities filings, is complete and authoritative. This dataset is analysed and combined with another dataset of all investments made under a group of schemes introduced in 1999 and the early 2000s. Together, these datasets provide a comparative picture of the effectiveness of government-backed schemes in providing VC investments.

The thesis makes its theoretical contribution by arguing that an evolutionary and capabilities perspective may be able to explain aspects of the development of VC in the US and UK that would not be as immediately explicable using a principal agent framework. In this way an evolutionary perspective, in providing an alternate

framing of issues of venture capital and small firm finance, may highlight areas for policy development that would not be immediately identified using the more standard principal-agent or contracting framework. It then makes initial steps toward discussing how the evolutionary perspective might be extended to address policy issues in a more full-fledged manner.

## *1.6 Conclusion and summary*

This chapter has introduced the thesis by providing a general overview of the topics and arguments discussed in later chapters. It has discussed the thesis's primary arguments, the main data on which analysis is based, and the structure used in presenting its arguments. It concludes by discussing the theoretical contributions made by the thesis, and the scope of the research.

The following chapter will begin to discuss the theoretical frameworks that will be employed in this thesis. It will discuss the nature of small firms and their growth, the role and structure of the VC sector, and the discussions within the literature of VC policy. It will conclude by discussing and framing the research question that will be operationalised and answered in subsequent chapters.

## **Chapter 2: Venture Capital, Policy and Theory: An Initial Framework**

### *2.1 Introduction*

The previous chapter presented an overview of the arguments and structure of the thesis, and discussed the data and contributions that will be presented in subsequent chapters. This chapter seeks to explain and contextualise venture capital and its role in policy. Venture capital has come to be seen as a key part of small firm finance, which will be discussed in Section 2.2. It will discuss venture capital, its structure and the roles venture capital plays in Section 2.3. The chapter then examines the role and structure of policies to support VC in Section 2.4. It then summarises theoretical perspectives in which the success of VC may be interpreted in Section 2.5. The chapter discusses and frames the research question and providing a framework for subsequent analysis in Section 2.6. The chapter summarises and concludes in Section 2.7.

### *2.2 Venture capital and its role in small firms*

For all the attention that venture capital has received, it is important to consider that it is not the only aspect of financing employed by small firms. In this section we will discuss the role and structure of small firms, and briefly summarise the literature surrounding small firm finance and risk.

#### **2.2.1 Small firms: their importance and growth**

Small firms are widely seen to be very important to national economic development. Their overall effects on national economies are debated, however they do play several key roles in economies. They have the opportunity to take advantage of emerging technologies (Rothwell and Zegveld 1982) to generate disproportionate effects relative to their size. These effects may often be linked to small firms' roles as innovators. Although their cumulative impact on innovation is less than that of large firms (Acs and Audretsch 1988), their small size and active management gives them the potential to exploit radical innovations more quickly

than larger rivals (Hoffman et al 1998). This is particularly true when firms operate in highly innovative industries with largely skilled labour and many large incumbents (Acs and Audretsch 1987). Further, the technological trajectories of the sectors in which firms operate have very different patterns and characteristics for the appropriability of innovations (see Pavitt 1984 and Tidd et al 2001 p. 114). Beyond the role of innovation, Storey (1982 pp. 13-14) identifies a number of other roles for small firms within the economy: among them that they generate jobs, and serve as the 'seedcorn' from which the large firms of the future will come.

Small firms have long been understood to play a key role in driving employment, driven by research such as Birch (1979), who argued that firms employing less than 20 people generated 66% of net new jobs in the US. This was later criticised and found to be somewhat misleading (see Davis et al 1993), but the idea has persevered and has become commonly accepted, despite the empirical challenges. It is clear that small firms have important roles to play in economic growth (see Wennekers and Thurik 1999), and that economies have increasingly become better structurally suited to the more dynamic roles that small firms play (Audretsch 2002).

The idea of small firms as potential large firms of the future draws on several related assumptions: that small firms have the opportunity to grow significantly, and (perhaps implicitly) that the greater the number of small firms that exist, the more likely large firms will develop. Both of these issues have been addressed extensively in the literature. Small firm growth has long been understood in terms of Gibrat's Law, the assumption that growth rates are invariant to firm size. This has been tested extensively (see the review in Sutton 1997, as well as Mansfield 1962, Wagner 1992, Lotti et al 2003, and Audretsch et al 2004). Although the results vary significantly, a general consensus seems to be that the law tends to be applicable somewhat generally, although there are a number of exceptions that have been identified.

The assumption that large firms may be grown from small firms is one impetus for policies supporting firm formation. However research (see Santarelli and Vivarelli

2007 for a review) suggests that although good firms with high growth potential do exist, the markets for new firms are very heterogeneous and increasing firm formation is more likely to encourage 'churn', in which firms enter and exit the market rapidly, destabilising the sector and impairing growth (see Beesley and Hamilton 1984, Caves 1998 and Agarwal and Audretsch 2001).

Once new firms are created, they face significant threats to survival. One phenomenon identified in Gibb 1990 and Aurswald and Branscomb (2003) is the 'valley of death' effect, in which firms seeking to grow must survive a period of low profitability and high mortality before becoming successful (see also Littunen 2000) This has been further empirically supported by data in Nightingale et al (2009).

### **2.2.2 Risk in small firms**

Although small firms' size and characteristics give them unique opportunities to exploit innovations, they also represent high levels of risk and uncertainty to potential investors. Screening potential investments is difficult, especially for potential funders of technology-based firms (Macmillan et al 1987), because of the specificity of the information involved. This specificity leads to higher transaction costs associated with identifying potential investments, screening these investments and moving forward with these investments (Dyer 1997). This is because the more specific (and therefore useful) the information used to evaluate a potential investment, the less useful that information will be for the examination of other potential investments (see Zander and Kogut 1995, Macmillan et al 1987, Guler and Guillen 2007). Further, the costs associated with gathering relevant information will be higher the more specific the information (Hansen 1999). However, considering small firms simply as 'risky' does not help us to understand the nature of the risks inherent in these firms. The forms of risk facing small firms may usefully be characterised in terms of market risk, technology risk, and agency risk<sup>2</sup>.

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<sup>2</sup> This typology is adapted from Fiet (1995 p. 553-554), who considers technology risk a part of market risk. Given our understanding of the endogeneity of technology (see Romer 1990), it is worth classing technology as a separate form of risk, as it is not necessarily an aspect of market or agency risk.

Market risk may be considered to be the sum of risks posed by external forces in the market. This includes factors such as the scale and level of competition (Scherer 1980); the risk of new entrants into the market (Porter 1980); the risk of substitute products (ibid); and poor market attractiveness (Tyebjee and Bruno 1984). Market risks may be addressed by understanding the dynamics of the market or sector in which a potential investment operates – in the case of the VC sector, this involves familiarity with the sector (Zider 2000 p. 134, Sahlmann 1990).

Technological risk is based in the inherent uncertainty that comes from the process of developing technology. The process of converting science into technology, and technology into a market-ready product, is far from linear (see Pavitt 1999 and Nightingale 2004). Therefore firms (especially small firms) with business models based on new technologies expose themselves to significant risks as they attempt to bring products to market. It is impossible to predict whether a technology will meet expectations, or meet those expectations on time (Tidd et al 2001 p. 146). However, investors who are familiar with a technology may then be able to use their understanding of that technology to evaluate the merit of a particular investment, mitigating that risk to some extent (Megginson 2004). Conversely, potential investors who lack an understanding of a technology must make an assessment based on only market and agency risk, opening them up to failure.

The risk posed by managerial staff is often framed in terms of agency risk and principal-agent theory (as in Alchian and Demsetz 1972 and Jensen and Meckling 1976), which frames the contractual relationship between two agents, and provides context for managing risk between owners and managers. Later in this chapter we will address the characteristics of the principal-agent view in more detail as a theoretical framing device. However before addressing the theoretical implications of this view it is important to frame the ways in which investors and firms manage the risks that come from these investments.

### 2.2.3 Finance for small firms

Given the risks discussed above, small firms face particular challenges in raising the capital they need to survive and expand. Because many small firms may not have a proven track record or assets, it may be difficult to raise funds (Storey 1982 p. 144-150). For innovative or technology based firms, raising capital is a significant challenge, given that R&D is capital intensive and inherently risky. Whereas most entrepreneurs may use personal funds or friends and family to back their ventures (see Avery et al 1998, Hanley and Girma 2006), the capital demands of technology-based firms tend to mean that they must look to external sources of capital (Cassar 2004), and must choose between seeking debt and equity funding.

Debt is the most prevalent form of external capital provision to small firms (Berger and Udell 1997 p. 67). Access to debt is characterised by two forms of information asymmetries: the *ex ante* risks that firms or individuals misrepresent their ability to suitability to repay the debt capital (adverse selection, as in Akerloff 1970), and the *ex post* risk that the firm will not operate under the terms of the contract (moral hazard) (Binks et al 1992 p. 36-37). Under conditions of adverse selection and moral hazard, Stiglitz and Weiss (1982) suggest that market failure may occur as 'gaps' emerge in the provision of debt as interest rates rise, driving out low-risk loan opportunities.

A solution to the lack of debt capital, as suggested by de Meza and Webb (1987) and Cho (1986), is that rather than seeking debt, small firms should seek funds from equity sources. The trade-off associated with equity funding is that entrepreneurs lose some of the control of their business.

The choice between equity and debt capital therefore becomes particularly relevant. Myers and Majluf (1984) argue that there is a 'pecking order' for firm funding. If firms do use external finance, they will seek out debt before equity funding because of the informational costs associated with giving and maintaining equity funds (ibid p. 584-585). This hypothesis has been widely examined (see Shyam-Sunder and Myers 1999 for one discussion). Small firms also provide



conflicting evidence about the pecking order hypothesis (see Watson and Wilson 2002 and Helwege and Liang 1996 for contrasting views). However, despite these much of this stream of research is more applicable to larger firms and is based on the assumption that small firms have a choice between forms of external finance, when in many cases they may not. In these cases firms may be forced into receiving external finance on undesirable terms (see Chaganti et al 1995).

For the earliest stage small firms, and particularly those oriented around technology, the financing options available may be particularly stark, as their assets may be largely based around intangible assets, rendering debt capital unlikely or impossible. However for some of these early stage firms with little collateral, these intangible assets may still be able to generate significant returns (see Zider 2000 p. 132). This is the market gap that the class of investments known as 'venture capital' seeks to fill.

### *2.3 Venture capital, its role, and its key relationships:*

There are many definitions of venture capital, but the one we will use in this thesis will be that adopted by Soderblum and Wiklund (2005), who adapt theirs from the European Venture Capital Association definition. In this way we identify venture capital as a financial intermediary that invests money from institutional funders in privately owned early stage companies that have large growth potential (p. 12). This approach to funding firms, referred to as 'classic' venture capital by Bygrave and Timmons (1992), may be contrasted with other approaches to equity finance that may provide refinancing for existing assets.

VC is part of the broad class of investments based around deals for equity in firms. These investments, characterised (particularly in Europe) as private equity, are broadly defined as including business angels - individuals who make equity investments in firms - and the broad sector of buy-out activity (ibid), identified by Bygrave and Timmons (1992) as 'merchant capital'. This latter sector involves providing funding for deals involving the ownership and management of firms. These may include management buy-outs (MBOs), management-buy ins (MBIs),

and buy-in management buy outs (BIMBOs). Although this class of investments (referred to broadly in the thesis as MBOs) is often called 'venture capital', especially in Europe, in this thesis they will be considered separately, as they are not the focus of the enquiry.

The venture capital sector is generally organised around limited partnerships, in which the venture capitalist serves as the general partner (GP) and the institutional investors who back the firm are the limited partners (LP) (Gompers and Lerner 2001, Zider 2000 p. 134). The limited partnership agreement gives the GP complete control over the fund, and governs the disbursement of the returns, which are usually designed such that GPs get priority in getting paid in order to avoid agency issues (ibid). At the same time the relationship is designed to ensure that the LPs have little say in the running of the fund, so their role is virtually that of a 'silent partner'.

One result of this structure is that VCs have several different types of interactions with stakeholders, and all must be managed well for a relationship to develop successfully. These relationships also give us a means of developing an analytical framework for examining the success of the VC sector, and we shall use the framework suggested in Zider (2000 p. 135) and Mason and Harrison (2002 p. 430) (and also used as a framing device in Gompers and Lerner 2002) to frame relationships as key elements for success of domestic VC sectors. These sub-areas of research include the relationship between VCs and the firms they fund (including selection and structuring of VC deals); between VCs and the institutional investors who back them; and between firms and the markets for investment exit. These three areas make up the core of the VC literature.

### **2.3.1 The VC-firm relationship**

Much of the literature surrounding the VC sector focuses on the dynamics of the relationship between VCs and the firms they back. This relationship generally focuses on several key aspects: the selection of investments; the staging and structuring of control rights; syndication; and monitoring and value addition.

### *2.3.1.1 Process of VC investment: Investment selection*

Selection is among the most prominent and important aspects of the VC process (Macmillan et al 1987). At its core is the identification and selection of firms with high growth potential. As early stage firms mature and become more established, they become less risky as investments. Therefore VCs typically face a trade-off in prospects between investing in younger firms that are riskier but have greater potential for high internal returns, and investing in rather more mature firms that are likely to produce an exit, but with smaller returns (see Cumming and Walz 2004, Murray 1999 and Macintosh and Cumming 2003).

There are a range of explanations of the importance and process of screening of VCs' investments. One important study showed VCs' main screening criteria to be the size of investment required, the technology and/or market, stage of financing and geographical proximity (Tybjee and Bruno 1985 p. 1062). Shortly thereafter Macmillan et al (1986) suggested that venture capitalists consider entrepreneurs to be the most important factor when screening investments (p. 128). This is due to the very dynamic market environment in which these firms operate, meaning that selection of entrepreneurs who will be able to address market change is crucial. (This will be discussed further in the context of dynamic capabilities in Section 2.6 and Chapters 4 and 5.) Macmillan et al (1986) also identified three screening types: VCs who have several detailed investment criteria that must be met; VCs who intentionally have few investment criteria, instead relying on serendipity; and VCs who invest in ventures that have high liquidity and operate in sectors the VCs know (ibid p.126-128). Zacharakis and Shepherd (2001) find that VCs are overconfident in their screening abilities. Meanwhile Shepherd et al (2003) find that experience increases screening skills, but only to a certain point, after which additional experience leads to worsening skills. More recent work has evaluated the role of business plans and cognitive structures in the selection process. Delmar and Shane (2003) find a positive link between quality of business plan and the likelihood of investment, while Honig and Karlsson (2004) find no

link. Kirsch et al (2009) suggest that business plans are based more in established ritual and tacit processes than actual signalling.

### *2.3.1.2 The process of VC investment: Control and deal structuring in VC-backed firms*

Once the initial investment is made, VCs then must structure the deals to manage both the business and managerial risk to which they are now exposed. There are a number of techniques used by VCs, but two particularly relevant techniques are staged investments (see Gompers 1995) and board control rights (see Kaplan and Stromberg 2001). These processes are often presented in terms of management of the principal-agent relationship.

Staged investments are among the most powerful tools available to VCs to minimise moral hazard risks. In staging investments, VCs set specific goals and criteria that must be met by the firm in order for the company to receive its next infusion of cash (Gompers 1995 p. 1462). This allows VCs to manage their agency risk as firms grow. Therefore infusions of funding may be more frequent in early stages of investing when firms are based more on intangible assets, but then may grow more widely spaced as the firm begins to accumulate tangible assets (Gompers and Lerner 2002 p. 164). It also facilitates the early identification of problems, giving VCs a window to wind down businesses that do not meet expectations without committing the entire sum promised to the firm (ibid). It serves as a way to ensure capital is allocated efficiently by firms without increasing the likelihood of the firm being liquidated (Sahlman 1990, Megginson 2002). Although staging can occasionally strangle good firms if VCs are not able to provide cash infusions on time (Steier and Greenwood 1995), staging has been found to be positively associated with the likelihood of reaching IPO (Gompers and Lerner 1999).

VCs also maintain control over investee firms via convertible securities. These are preferred stock shares that may be converted (usually at the VCs' discretion) into additional ordinary shares (Gompers 1993). These enable VC control in another way, ensuring that VCs will be paid first, but also providing them with a powerful mechanism for ensuring control while optimising returns (Sahlman 1990). These

powers give the VCs control over cash flow, membership of the board, and liquidation rights, among others. (Kaplan and Stromberg 2003). If the firm does poorly, control is allocated such that VCs will obtain full control (Kaplan and Stromberg 2004, Aghion and Bolton 1992, Hellman 1998). The removal of executives and managerial teams has generally been found to be much more common in the US than Europe (Hege et al 2003 and Schweinbacher 2002).

### *2.3.1.3 The process of VC investment: Syndication*

Once an investment is identified, VCs will often partner with other investors to jointly make an investment. The reasons for this have been debated and remain rather unclear. Soderblom and Wicklund (2005) suggest that there have been numerous rationales suggested for syndication, among them: risk diversification, in which VCs use multiple investments to diversify the risk profiles of their portfolios (see Gompers and Lerner 1999, and De Clercq and Dimov 2003); and information sharing (see Stuart and Sorenson 2001), where VCs syndicate to expand the boundaries of their individual sectoral and locational knowledge. Other rationales include improved screening, where VCs get second opinions on their investments (see Lerner 1994, drawing upon Sah and Stiglitz 1986); deal flow, in that VCs let other investors into promising deals with expectations of reciprocation (see Lerner and Schoar 2004); value addition in portfolios, where VCs accumulate different skills for value addition via syndication (Hellman and Puri 2002, Hellman et al 2004) and image, where VCs syndicate for reputational gains (Hsu 2004). Similarly (and more cynically), firms may demonstrate classic 'window dressing' behaviour by joining late-stage syndicated investments to give the appearance of having invested wisely, even if there is little financial gain involved (Lakonishok et al 1991).

Once they decide to syndicate, VCs tend to identify syndication partners through existing networks (Gompers and Lerner 2002 p. 258-259), although the ways in which networks are deployed may depend on the purpose for which the syndication is being done. They generally partner with firms who have similar (or slightly lower) levels of reputation, suggesting that first-tier VCs (if such a distinction exists) would be more likely to syndicate with first- or second-tier VCs,

and that fourth-tier VCs tend to syndicate with other fourth-tier (or lower) investors (Lerner 1994).

#### *2.3.1.4 Monitoring and value addition in venture capital investments*

The venture capitalist's role post-investment is debated and subject to theoretical interpretation. Some approach the VC's role as primarily one of monitoring investments (see Gompers 1995, Kaplan and Stromberg 2001). Monitoring activities seem to be related to more directly to the relationship and characteristics of both the VC and the firm in question (Sapienza and Gupta 1994). Use of monitoring activities over shorter intervals has also been found to increase the rate of returns on investments (Hege et al 2003).

Moving beyond pure monitoring, a range of additional value addition activities performed by VCs have been identified. Boards of VC-backed firms have been shown to be more active in strategy formation than boards without VC-backing (Fried et al 1998). Cumming et al (2005) characterise the value addition activities as financial, marketing, administrative and strategic/management, and find financial and strategic/management value addition activities are associated with more successful VC fundraising. Although such detailed breakdowns are not always available, Sapienza (1992) and Sapienza et al (1996) shows that US VCs play a unique role in value addition. Hellman and Puri (2000) suggest that VC-backed firms are more likely to have their products reach market than non-VC-backed firms. One possible explanation for this is that VCs are able to add value by using their networks to add value and help bring their products to market, as in Steier and Greenwood (1995 p. 347-8). This area, including the definitions of 'monitoring' and 'value addition' is particularly relevant to the thesis and will be discussed in further detail subsequently in Sections 2.5 and 2.6.

#### **2.3.2 The LP-GP relationship: VCs and institutional investors**

There has been a limited but growing literature on the attitudes and behaviour of limited partners (LPs), the investors who back VC and other asset classes. LPs' attraction to VC and other alternative investments comes from the unusual nature of the risks and rewards associated with the sector, which are different from those

of conventional asset classes (Schneeweis and Pescatore 1999). Despite the lack of transparency in the VC and PE sectors (Schmidt 2003), the risk profile of the alternative investment sector is so different from traditional market-associated risks that it becomes appealing to LPs.

Beyond this there are other pressures associated with investment in these areas, whether due to business concerns of LPs (see Hellman et al 2004, who suggest banks back VC as a means of driving potential business later), or associated political and other motivations. Lerner et al (2005) suggest that university endowments tended to be the most sophisticated investors relative to alternative investments, whilst public pension funds tended to be the least sophisticated.

The selection of which VC funds to back is also important. Sahlman (1990) suggests that more successful funds will be those more willing to make fixed-term investments with incentives most closely linked to performance. This drives VCs to seek to prove themselves, leading to widely varying results (see Gottschalg et al 2004). Given this pressure Gompers (1994) shows that young VCs who have less experience are more likely to exit their investments quickly (possibly too quickly). They do this as a means of signalling to potential investors that they are capable of delivering positive results, a phenomenon that Gompers calls 'grandstanding'. Although grandstanding phenomena may be detrimental to firms, they make up part of the reputational capital (see Megginson 2001) that plays a key role in the development and growth of networks (which will be discussed later in Chapter 4).

### **2.3.3 Supply and demand factors: Exit markets**

In order for VCs to deliver the returns they promise to institutional investors, they must first exit their investments. Cumming and Macintosh (2003) identify five ways in which a venture capitalist can exit an investment: initial public offering (IPO); trade sale, in which the whole company is sold to another firm in that sector; secondary sale, in which the company is sold to other financial institutions; buyback, in which entrepreneurs buy the VCs' shares back from them; and liquidation, where the VC abandons the investment.

Of these investments VCs often rely on the markets for IPOs and trade sales to provide successful exit opportunities (Jeng and Wells 2000). Of the options VCs face when seeking to exit an investment, IPO is the most preferable option – in the peak of the dot-com boom, VC investments exited by IPO provided 60% internal rate of return versus acquisitions, which provided only 15% IRR (Black and Gilson 1998). In addition to these high returns, IPOs are also prestigious, providing valuable reputational boosts to VCs and serving as a benchmark of VC success that can be used to further verify additional investments that come up for IPO (Megginson and Weiss 1991). There is disagreement in the data on the importance of the length of time that an investment is held for the final investment valuation (see Giot and Schwienbacher 2005 and Megginson and Weiss 1991 for differing views). Gompers (1995) shows that younger VC firms are more likely to have lower exit values, which is again linked to the ‘grandstanding’ phenomenon discussed above. The US system has thrived in large part because there have been successful exit opportunities to VC-backed firms (Megginson 2002, Black and Gilson 1998). Conversely, in countries where IPO options for exit are absent or weak, the VC sector has generally been weak as well, necessitating other means of exit (Jeng and Wells 2000, Armour and Cumming 2007).

## *2.4 Policy and national performance of VC sectors*

Much of the literature described in the previous section was based upon studies of the US venture capital sector. The US VC sector was the first, and remains the most successful, venture capital sector. However there has been significant interest in attempting to replicate the success of the US in other nations, with a body of literature emerging that examines the elements of US or other national policies for encouraging VC. This literature may broadly be broken down into broad comparisons of national VC sectors, and studies of particular national schemes.

### **2.4.1 Comparisons of national VC sectors: Policies and institutions**

There are a number of roles that governments may play in supporting venture capital sectors that have been linked to more successful VC sector involvement. These include setting legal and regulatory environments, support for supply-side



factors that enable VCs to raise funds, and interventions that support firms, either directly or indirectly.

Legal and regulatory frameworks include areas such as tax rates, bankruptcy laws, labour regulations and general legal structure. Gompers and Lerner (1998) find that decreases in capital gains tax (CGT) rates are associated with the commitments to new VC funds, while Poterba (1989) suggests that CGT may also drive demand for VC by promoting entrepreneurship. These suggestions are supported by economic models in Keuschnigg and Nielsen (2003, 2004). Cumming and Walz (2004) suggest that more robust legal protection for VCs' returns may also be linked to higher IRRs. Bankruptcy laws that do not penalise repeat entrepreneurs have also been argued by Cumming et al (2008) and Cumming and Armour (2006) to foster entrepreneurship as part of a 'legislative road to Silicon Valley'. Similarly, restrictive laws on the labour market have been found to be linked with lower VC activity (Black and Gilson 1998, Jeng and Wells 2000). There is also limited evidence (largely relating to the US, see Gompers and Lerner 1998 and Marti and Balboa 2001) discussing the role of government regulations in supporting the raising of funds for VC investments via institutional investors.

Further, there is a cluster of literature suggesting that, in line with La Porta et al (1998), countries based on English common law provide better protection and incentives for growth than do firms based on the legal systems of continental Europe and Japan. Lerner and Schoar (2005) find that firms in common law countries tend to have higher valuations than those in countries with other legal systems. Megginson (2002) similarly suggests that VCs have easier access to IPO markets in countries with common law legal systems. These findings are echoed by Black and Gilson (1998) and Armour and Cumming (2006).

Extensive evidence (see Black and Gilson 1998, Jeng and Wells 2000, Megginson 2002, Armour and Cumming 2006) shows that VC is most successful in nations with deep and liquid stock markets. Most firms are found to prefer to seek exit via a market that is close to them (Jeng and Wells 2000), which then in some cases rules out the most lucrative markets such as NASDAQ. The main exception to this

is the Israeli VC sector (Avnimelech et al 2004), which has grown by using NASDAQ as its primary means to exit.

In recent years additional attention has been directed toward the building of an 'enterprise-friendly' business culture in Europe, in line with many of the objectives described above. The Lisbon Agenda of 2000 set forth a vision of Europe as a hub for knowledge-based industries, aiming to become the world's most common and dynamic knowledge economy by 2010 (European Commission (2003); although see Watson (2001) for a more sceptical view). This was based on extensive Europe-wide investment in R&D but also had elements of streamlining employment and business regulations (Soete 2004 p. 106). Venture capital is widely perceived to be a key part of this, by providing the capital that will enable this transition to a knowledge economy (see Hanusch and Pyka 2007 p. 8). Consequently there has been significant policy interest in interventions to develop and support VC sectors not just by creating a business environment in which they can thrive but by more directly intervening to provide funds to support firms or investors. These schemes have been based on a variety of rationales, but the dominant rationale is the market failure approach.

#### **2.4.2 Market failure and government interventions in VC sectors**

When examining the rationales given for policy intervention in the provision of capital to firms, perhaps the most common justification used is market failure. Murray (2007, p. 116-7) discusses the ambiguity of the term market failure, which often moves beyond its traditional association of the price mechanism failing to achieve social aims, and instead becomes a rhetorical device indicating that some actors are unable to find funding. In such a setting, the issue becomes identifying whether such a result is due to an inefficient market (in which case there is a failure of supply), or whether the markets are operating efficiently and are not giving funds to poor investments (in which case there is a failure of demand) (ibid).

This perceived 'market failure' lends itself to the interpretation of an 'equity gap', where financial institutions are interpreted to be failing to provide small firms with the funding they require. The idea of an equity gap has been especially prominent in the UK, where such a 'gap' was originally identified in 1931 and has been the target of ongoing policy intervention for nearly eighty years. Murray (2007 p. 118) suggests that 'equity gaps' remain an issue around the world. However the scale and historical scope of the case of the UK equity gap are significant. Murray (1999) has suggested that the term 'equity gap' implies that there may be only one such gap, when in fact there may be several at different key points in firm growth.

In cases where there is (or is perceived to be) market failure, there are several direct means that governments have used to intervene to support the growth of domestic VC markets. This has been addressed in two ways from a policy perspective: by addressing the demand side of capital by supporting entrepreneurs, and by supporting the supply side by providing financial or other support to VC sectors. Murray (2007, p. 127-128) provides a general typology of both forms of interactions, and we will subsequently discuss these roles.

#### *2.4.2.1 Government intervention in entrepreneurship*

There are a range of ways in which policymakers has support the role of entrepreneurship, and Murray (2007, p. 127) presents one framework that presents a five-part typology for policies may stimulate entrepreneurship. These are demand-side intervention, supply-side intervention, input factors, preferences, and individual decision-making processes. From this perspective demand-side and supply-side interventions are focused on R&D expenditure (such as the US SBIR programme, see Lerner 1999) and stimulating competition for the former, and labour mobility (see Black and Gilson 1998 and Saxenian 1998) and regional development (see Mason and Harrison 2003) for the latter.

Other forms of intervention to support entrepreneurship include input factors such as higher education (see Galbraith 2007 on the role of higher education in US economic success, as well as Dosi et al 2006). Influencing preferences is another

form of intervention – by changing the images of entrepreneurs and entrepreneurship policymakers may make starting one's own business more appealing (see Peterman and Kennedy 2003 and Kruegel and Brazeal 1994). Finally there are issues that support the decision-making process and support business operations, such as those matters discussed above regarding taxes, bankruptcy laws and the overall legal framework for potential founders of new businesses.

These interventions are intended to make it easier and more desirable for potential entrepreneurs to 'take the leap' and found their own businesses. However these incentives are subject to the risk of market 'churn' identified in Santarelli and Vivarelli (2007), who suggest that encouraging firms to enter markets only drives older firms out of business, creating relatively few net positive effects. In this way there is something of a tension between Santarelli and Vivarelli's implication that firm growth is perhaps a more appropriate policy objective than firm formation, and the common policy focus on the supply of capital. This represents an ongoing tension in the area of small firm policy: between supply-side policies (which focus on building the supply of capital available to firms, and implicitly seek to drive firm creation) and demand-side policies (which focus on growing existing firms and building demand *for* capital from firms) that will inform later discussions of policy, particularly in the UK. Another implication of this is discussed below, in terms of the types of roles governments play in intervening in VC.

#### *2.4.2.2 Government intervention in VC: Direct and indirect roles*

Murray (2007, p. 128) suggests that there are two generic forms of government interaction: direct intervention, where the government itself plays venture capitalists, and indirect intervention, where the government plays a role in supporting the activities of private VCs.

Direct intervention comes when governments themselves play a role in distributing funds (for example see cases in Finland (Maula et al 2007)). One key debate in this area is whether direct government intervention in national VC

sectors helps or hurts the development of private VC. Armour and Cumming (2006) and Cumming and MacIntosh (2006) discuss evidence from Canada that government-backed VC ‘crowds out’ the investments of private VCs by providing funds on better terms with fewer conditions or oversights, resulting in a ‘market for lemons’ for poor quality firms. However Leleux and Surlemont (2003) and Manigart and Beuselinck (2001) find no such ‘crowding out’ effect in a pan-European sample, although Manigart et al (2002) find that public VCs expect lower rates of return than their private counterparts.

Indirect intervention takes the form of schemes where public support is given to increase the returns to private funds. These have been seen more widely in cases such as the Yozma scheme in Israel (Avnimelech et al 2004). More recently this has taken the form of hybrid schemes in which government funds are pooled with private funds to support VC funds. The small but growing body of literature on hybrid venture capital funds (see Jaaskelainen et al 2007, Murray 2007) points to the role that governments can play in boosting the risk-reward profile of potential investments that VCs might make.

This section has summarised the literature on government interventions in venture capital and small firm finance. Despite the range of empirical literature addressing various aspects of the venture capital sector, the theoretical perspectives that underlie these analyses is often unclear. The following section will present contrasting theoretical interpretations of VC that will facilitate the creation of a theoretical framework for the subsequent analysis.

## *2.5 Economic perspectives and venture capital: Principal-agent and evolutionary views*

This thesis seeks to explain and extend our understanding of the role of policy in the emergence of VC in light of the prevalent theoretical understanding and an alternate perspective that may explain additional nuance and detail. This section will discuss the prevalent principal agent approach as well as the potential of the

evolutionary and capabilities perspective to explain the activities of venture capitalists.

### **2.5.1 Principal-agent theory and venture capital**

The field of venture capital, dealing as it does with the relationship between an investor and a firm, is a good area for the exploration of issues relating to principal-agent theory. Variations of an agency-centred model of the firm have been proposed by Alchian and Demsetz (1972), Jensen and Meckling (1976), and Fama and Jensen (1983). This approach drops the assumption of informational symmetry seen in the standard neoclassical model (Nightingale 2008 p.548), shifting the focus to incentives and monitoring costs. As it does this the definition of the firm itself changes. Whereas Coase (1937) and the transaction cost economics (TCE) model characterise the firm as a unit able to minimise transaction costs, the agency approach (particularly Alchian and Demsetz 1972) argues that the firm is ultimately a 'legal fiction' made up of a nexus of contracts. In this perspective firms consist of groups of individuals who are contracted to provide services to each other in a particularly specialised market (ibid p. 777). In this perspective the whole of economic activity may be explained via incentives; any activity may be made possible if the incentive structure is correct.

The informational asymmetries between investors and firms, and the associated agency, moral hazard, and hidden information risks posed by this relationship make the VC case an ideal situation in which to test and extend agency theory (as in Alchian and Demsetz 1972 and Jensen and Meckling 1976). Consequently the VC literature has seen significant research addressing principal-agent-related issues, for instance contracting (Kaplan and Stromberg 2001, 2003; Trester 1997); moral hazard and learning by parties in the agency relationship (Bergeman and Hege 1998, Chan et al 1990). The risk posed by managerial staff is often framed in terms of agency risk and principal-agent theory, but does not solely include issues of dishonesty and information asymmetry. Fiet (1995 p. 554) includes monitoring costs such as distance between investor and firm (Gupta and Sapienza 1992), portfolio size (in which larger portfolios allow less time for investment

monitoring) (Cumming 2006), and various forms of game playing (Williamson 1975 p. 30) as constitutive of additional elements of managerial risk. These all incorporate human and managerial aspects in the success of the firm, and are generally managed by the manipulation of incentives and contracting (see Hellman and Puri 2002).

This principal-agent perspective is obviously very useful for explaining many functions of VC, and these explanations deeply inform the VC literature. For instance significant portions of the literature refer to the VC-firm relationship in terms of 'monitoring' and its associated costs, adopting the principal-agent terminology (see Gompers 1995 and papers cited above). From a strictly principal-agent perspective the role of the venture capitalist is largely based on ensuring that the activities of the management are consistent with his or her own goals. The relationship is viewed and modelled as an exercise in appropriate contracting and ensuring that resources are distributed in the manner that will ensure appropriate desired outcomes of all parties. From this perspective (taken to its more extreme extension) the relationship between the VC and the firm is simply a contractual relationship between two nexuses of contracts, with no other interaction required.

While few VC scholars would accept the extreme definition of monitoring as the sole, definitive sum of post-investment activity by VCs, it does represent something of a bias in the literature. Contracting and monitoring (and indeed general awareness of agency risk) are crucial to VC success. However adopting an extreme position that disregards any other VC-firm interactions from impacting the firm is also likely overly simplified. Further, a purely agency-based interpretation of the role of the VC characterises the success of VC simply in terms of deal identification and management of agency risk. This more simplified approach may be amenable for certain forms of economic analysis, but may also disregard other elements of the venture capitalist's role. We now seek to explore the explanations of the evolutionary perspective of the firm, which provides a fundamentally different explanation of the economic activities in which VCs engage.

### **2.5.2 Evolutionary and capabilities-based approaches**

While the principal agent approach uses as its core a neoclassical model with only one key assumption of the traditional neoclassical model suspended, the evolutionary perspective rejects most of the assumptions of the neoclassical approach. This evolutionary approach rejected equilibrium in favour of a Schumpeterian dynamic interpretation of the economy (Nelson and Winter 1982 p. 278-287). It also adopted the Schumpeterian (Schumpeter 1950) notion that innovation drives the development of economies (Nelson and Winter 1982 p. 277). It adopted a bounded rationality approach in rejecting the neoclassical view of firms as maximising utility among set options, instead incorporating and adapting the notion of routines (Nightingale 2008 p. 554).

The evolutionary approach's alternate understanding of firms is also fundamentally realist in that it seeks to represent economic entities relatively closely to their actual roles, for instance viewing firms not as artificial constructs but as actual organisations that, in models, act approximately as 'real' businesses would (Dosi and Marengo 2007 p. 492). Its theories are grounded in what agents 'on the ground' do, and why they do it (ibid). Firms are understood to be composed of routines, defined as a "pattern of behaviour that is followed and repeated but is subject to change if conditions change" (Winter 1964, p. 263). These are preserved and passed on through organisations (Dosi et al 2000) and are based around the process of problem solving (Cohen et al 1996). Crucially, the outcomes of problem solving processes differ (Nelson and Winter p. 132). This, and the metaphor of routines as the 'genes' of an organisation (ibid p. 134-6), lead to a key distinction between the evolutionary and neoclassical perspectives. Whereas the neoclassical view understands firms as identical, the evolutionary approach allows for firm heterogeneity from the ground up. Firms in evolutionary theory are understood to be composed of different routines and will have different approaches, thus engendering heterogeneity required for the evolutionary competition that will determine whether firms thrive or fail (Nelson and Winter 1982 p. 41-43).

The evolutionary framework set out in Nelson and Winter (1982), Freeman and Soete (1997), Dosi (1982) and others laid the intellectual and economic framework



for an alternate, heterodox interpretation of economic activity that ultimately viewed knowledge as the basis of the firm<sup>3</sup> (Dosi and Marengo 2007 p. 498). Developing parallel to this new line of economic activity was an emerging broad school of management theory that welcomed the evolutionary perspective and developed a framework for the study of management issues that was complementary to the evolutionary perspective. This approach had its roots in the resource-based view (RBV) of the firm<sup>4</sup>. The RBV perspective characterises firms as ‘bundles’ of resources (see Penrose 1959 p. 63, Amit and Schoemaker 1993) that may gain and sustain a firm’s advantage over time (Peteraf 1993). Firms gain sustainable competitive advantage by utilising resources that allow them to create value in ways their competitors cannot (Eisenhardt and Martin 2000 p. 1105).

The knowledge resources that firms deploy are then characterised as capabilities<sup>5</sup> (Tidd et al 2001). This perspective has its roots in Cyert and March’s (1963) behavioural view of the firm, in which firms are seen as adaptive systems that address problems using routines, procedures and shortcuts, and are able to learn over time. This perspective informed Nelson and Winter’s discussion of routines, but also informed a more knowledge and capabilities-based explanation behind the makeup of firms (see Foss and Knudson 1995 and Montgomery 1995).

At the same time this approach’s flaws began to become clear in that it made little explicit allowance for changes in capabilities over time – although markets and firms operated in dynamic environments, the capabilities framework did not provide a means to address changes in firms over time (see Chandler 1992). This problem was addressed and extended by Teece et al (1994, 1997), who extended the framework to address dynamic markets, describing ‘dynamic capabilities’ as

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<sup>3</sup> This general term should not be confused with the knowledge-based view of the firm (KBV) which adapts RBV perspectives but puts knowledge purely at the centre of the firm. See Grant (1996) for one approach to such a view, and Tsoukas (2003) for a discussion of its consequences.

<sup>4</sup> Nightingale (2008) frames the differing metaphysical and epistemological contexts of the history of the theory of the firm as part of a broader paradigm shift. In this process he identifies fundamental cognitive and theoretical differences between the RBV, and capabilities/dynamic capabilities views described. Given that these views share far more commonalities in their assumptions than differences, they will be discussed henceforth as a capabilities-based view of the firm. This is intended to serve as an over-arching category representative of the common characteristics of these views and their evolutionary underpinnings.

<sup>5</sup> Tidd et al (2001) refer to these knowledge resources as competences, while others refer to them as capacities. For the purpose of this thesis, we treat this as an issue of nomenclature only.

resources used by managers to “integrate, build and reconfigure internal and external competencies to address rapidly changing environments” (p. 516). While this theoretical approach introduced the ability to address dynamism in the market, it was also argued by some (see Mosakowski and McKelvey 1997) to be tautological (in that dynamic capabilities in this sense were defined by their effects). This was a valid argument, as the reality of dynamic capabilities, and the ease with which they might be identified, was left unclear in Teece et al’s framework. In order for the theory to be more fully extended, it required an extension from a more explicitly realist perspective.

This modified approach was proposed by Eisenhardt and Martin (2000), who took a realist perspective on dynamic capabilities, holding that they were specific, identifiable, and common among firms (in that they resemble ‘best practice’) (p. 1106). Further, they differentiated between dynamic capabilities and the routines (i.e. non-dynamic capabilities) that characterised only moderately dynamic industries as “complicated, detailed, analytic processes that rely extensively on existing knowledge and linear execution to produce predictable outcomes” (ibid). This was contrasted with dynamic capabilities, which are identified as “simple, experimental, unstable processes that rely on quickly created new knowledge and iterative execution to produce adaptive, but unpredictable outcomes” (ibid). The evolution of dynamic capabilities was then presented as being driven by learning mechanisms (ibid).

The evolutionary and capabilities framework provide a useful means of examining the industrial dynamics from its base levels, providing a very different perspective than that seen in the principal-agent framework. See Table 2.5.1 for a summary of the differences between these perspectives.

**Table 2.5.1 Principal agent vs. evolutionary and capabilities views of organisations (adapted from Dosi and Marengo 2007 p. 494)**

<b>Dimension of analysis</b>	<b>Principal agent view</b>	<b>Evolutionary/capabilities view</b>
Problem solving/cognition/knowledge	No	Yes (central focus of analysis)
Incentive governance	Yes (central focus of analysis)	Not necessarily (see Coriat and Dosi 1999)
Behavioural microfoundations	Perfect, far-sighted, rationality	Bounded rationality with limited vision
Organisational behaviour	Strategic (in a game theoretic sense)	Driven by routines and capabilities
Learning	No	Yes
Units of analysis	Transactions; strategies; allocation of information; allocation of property rights	Capabilities; routines; institutions (arguably)
Noneconomic dimensions of organisations	Not necessarily	Trust, power, etc
Economic dimensions outside the firm	Not unless directly contracted/incentivised	Institutions play key role, even if indirect

Given the potential usefulness of the evolutionary perspective, it is therefore moderately surprising that there is not more scholarly literature examining venture capital and its emergence from a broadly evolutionary or capabilities-based perspective. Capabilities are generally discussed in passing in the VC literature (see Fried and Hisrich 1994 p. 31, and Locket and Wright 2005, who present a capabilities-based explanation of university spin-outs), but there is still significant scope for a more theoretically-based examination of the VC sector and its emergence in a capabilities-based perspective. This thesis will attempt to fill this gap by presenting the emergence of the VC sectors of the US and UK from a capabilities-based perspective, and arguing that this approach may yield unique insights that a principal agent perspective is less able to present. It will also adopt Eisenhardt and Martin's realist perspective on dynamic capabilities, interpreting capabilities as real and identifiable. Chapters 4 and 5 will seek to identify these capabilities for the sectors they will study as part of the venture capitalists' relationship with the management of risk.

## 2.6 *Framing the thesis research*

### 2.6.1 **The role of comparison of national sectors**

This thesis seeks to fill a gap in the literature by examining the comparative development of two national VC sectors. Much of the comparative literature described in this chapter (see for instance Jeng and Wells 2000 and Armour and Cumming 2006) has been based on analysis of quantitative cross-country data, often drawn from national or international VC trade association. Other aspects of the comparative literature (see Sapienza et al 1996, Manigart et al 2002) have been based on cross-country survey data.

These comparative studies link into a stream of literature debating the extent to which the success of the US may be extrapolated to other national cases. Murray (2007 p.121) discusses the problem that the case of the US poses to policymakers in other countries. Several pieces of the comparative literature (see Armour and Cumming 2006 and Jeng and Wells 2000) discussed in Section 2.4 carry the implicit assumption that if a nation follows the sets of policies (particularly legal and regulatory policies) found in the US, that a nation will move into a position to replicate the US VC sector's success. However this is challenged by Gilson (2003), who suggests that following the US case is impossible because of the combination of circumstances that facilitated the creation of Silicon Valley. Similarly, Kenney and von Burg (1998) draw upon David's (1985, 1994) concept of path dependence to argue that simple replication of the US VC sector ignores the range of institutional and historical path dependent factors that have driven the US success and make replication or emulation of this success much more difficult.

If one accepts the view, discussed above, that there is a single 'road to Silicon Valley' that includes a set of legal and institutional regulations, then in principle the replication of the success of the US should be relatively straightforward. If another country makes its legal and institutional framework as similar as possible to that found in the US, that country's VC sector should grow and flourish.

The UK is widely presented as an example for this argument; with its VC sector one of the largest in Europe, it would be interpreted as a success story for VC. However if we examine this case more closely, the results do not seem to easily mesh with this view. Sapienza et al (1996) suggest that the UK VCs' role in venture addition was similar to that of the US, but slightly weaker, given that the UK's industry was less mature. Although the means for measuring maturity are subjective, the UK VC sector in 2009 seems less well-developed than the US VC sector in the early 1990s (approximately thirty years after its founding). Further, some of the data that supports the assumption of the UK's success (for instance Jeng and Wells's (2000) finding that 45% of VC investments in the UK exited in 1998 did so via IPO) differs from the results expected elsewhere (i.e. Murray (1994), who found that IPOs were the third most popular means of exit for VCs because of their associated risk). Further, significant concerns have been raised that the UK venture capital sector (and the financial community more broadly) is not playing a sufficient role in the provision of capital to small firms (HMT/SBS 2003). This raises a question: if the UK shares the common law, institutional and other backgrounds perceived by the VC literature to be part of the 'legislative road to Silicon Valley' (as in Armour and Cumming 2006), and is seen widely as a VC success story, why has the 'equity gap' persisted, and why did the UK government announce in 2009 the creation of a £1bn fund to invest in technology based firms (BIS 2009)?

It is this paradox that this thesis seeks to address. It intends to provide context for the comparison of the VC sectors of two nations with similarities in legal, political and institutional structure. Its broad aim is to understand why the UK VC sector has followed a different path of emergence from that of the US. More specifically, it seeks to understand the role that policy has played in growth of the VC sector in the UK and US. The role of policy in the development of these sectors is crucial in that it allows us to determine the extent to which interventions made in one case have been comparable to interventions made in another case. The UK and US governments have both had extensive involvement in supporting their domestic VC sectors, and the form of these interventions, and the subsequent outcomes, is the main area for analysis.

### **2.6.2 Research questions and a theoretical framework**

The empirical aspect of the research question therefore seeks to understand the role that policy has played in the emergence of the VC sectors of the US and UK. However a pure comparison is only of limited value; a broader theoretical perspective is required in order to fully contextualise and understand the differences between the two cases. In order to do this, we must draw not only upon the observed role of policy but also seek to understand the stated framing assumptions that have played underlying roles in the emergence of the VC sector. While our understanding of these framing assumptions is naturally limited to those that have been stated or demonstrated, they can provide us with the grounds for theoretically-informed analysis.

The overall research question asks: ‘What has been the historical role of policy in the emergence of the UK and US venture capital sectors? Further, are the stated or implicit framing assumptions behind the creation of UK policy, particularly regarding the principal-agent perspective, reflective of empirical data? And can the evolutionary perspective provide theoretical understanding of the VC sector that a principal-agent view cannot?’ The first part of this question will be addressed empirically and will be discussed in more detail in the following chapter. However in order to provide the needed theoretical insights, we must develop a theoretical framework for answering the second and third research questions presented above, particularly relating to principal-agent and evolutionary views and their relation to venture capital.

The principal-agent view is perhaps the most common theoretical perspective used in explaining the dynamics of the relationships in which venture capitalists engage. The principal-agent approach draws upon the view that all relationships are contracted and the economic system is based upon incentives and their appropriate application. From this perspective the VC sector is characterised by efficient contractual relationships in which the management of principal-agent risk is the basis of the relationship between VCs and the firms they back. Everything in this relationship is straightforwardly subject to incentive or control structures:

agents act rationally and in expected ways. There is little scope in this perspective for the role of institutions outside the VC-firm relationship, or for non-economic elements to the relationship. Further, because agents act rationally and under contractual bases, we would expect the process of developing a national VC sector to be relatively straightforward. Replicating the VC sector of the US in the UK or elsewhere would largely be an issue of addressing any market failures present (and otherwise seeking to create an open and competitive business environment) and ensuring that VCs were in place in order to efficiently distribute the funds to firms that needed financial support.

This may be contrasted with the interpretation of VC that would be generated from an evolutionary perspective. From this perspective the VC sector is characterised by capabilities and dynamic capabilities. These are the main area of analysis. VCs and firms in this perspective act in a boundedly rational manner, making the best judgments they can under limited information. From this perspective the role of venture capitalists would not simply be one of providing funds to firms, but would instead be defined by the value addition that VCs provide to firms via their existing relationships. This value addition is based upon existing capabilities, which are themselves reflective of the institutional context in which firms operate. From this perspective specific institutional factors shape the emergence of capabilities in a path-dependent manner. Consequently the policy implication would be that replicating the success of the VC sector of the US would not be a simple matter of policy change, but would involve designing policies reflecting those institutions in place in a given country. A summary of the differences between the principal-agent and evolutionary perspectives is presented in Table 2.6.1

**Table 2.6.1 Principal agent and evolutionary and capabilities explanations of venture capital**

<b>Dimension of analysis</b>	<b>Pure principal agent view</b>	<b>Pure evolutionary/ capabilities view</b>
VC defined as:	Contractual equity-based relationship between investors and firms	Equity investment with value addition based upon a two-way relationship
Role of contracting	Yes (central dimension of analysis)	No
Role of capabilities	No	Yes (central dimension of analysis)
Institutions	No	Yes
Networks	No	Yes
Value addition	None; only aspect of VC relationship with firm is monitoring	Yes
Policy agenda	Clear: address market failure and agency relationships	Unclear: no initially obvious policy agenda

These present a clear distinction between the ways in which these two perspectives would interpret the role of venture capitalists. This is the distinction that the subsequent research will seek to operationalise. In analysing the cases of the UK and US, these two views present contrasting sets of predictions.

The principal-agent view would explain the US as a case in which any initial market failures were addressed (likely by policy measures), and that consequently the market has operated efficiently. From this view the sector largely would have taken care of itself, assuming that appropriate contracting ensured the efficiency of the markets. This view would predict the UK VC sector to be able to generate similar levels of success as long as efficient screening and contracting was in place, and market failures were addressed. These would be areas for policy, but would suggest that once market failures were addressed the sector should flourish.

The evolutionary view would be expected to explain the case of the VC sector in the US as an instance in which capabilities have been developed over time that have allowed it to succeed and grow rapidly. It would expect that those capabilities would reflect the institutional structure of the US. The policies implemented by the US government would then be expected to have supported the development of



capabilities that enabled the sector to become successful. This view would predict the UK as being relatively unlikely to directly replicate the success of the US, given the UK's path-dependent historical differences (even if it does have more similarities with the US economy than differences). The success or failure of policies directed toward supporting the VC sector in the UK would be determined by their ability to support the creation of capabilities.

The empirical chapters that follow will allow us to examine these sets of predictions in order to determine the extent of these approaches' explanatory power. We would expect to see both theories demonstrating some ability to explain aspects of both sectors. Given the extensive literature on the high-tech sectors of the US, we would expect both theories to have some explanatory power for that case, as they will likely have already been considered in that context. However the proposed explanations made by these theories for the ability of VC to grow in the UK are rather more clearly distinct, and should allow the identification of clear differences in the explanatory ability of these two perspectives. Once we have examined the differences in these two cases, we will be able to answer our research question, providing a theoretically-informed explanation of the role of policy in the success of venture capital sectors of the US and UK.

## *2.7 Conclusion*

This chapter has provided an overview and general empirical and theoretical framework that will be used to answer the research questions posed in this thesis. It discusses the role and importance of small firms, as well as their financing. It has summarised the three key relationships in which venture capitalists engage and has reviewed the literature on these areas. It has also reviewed the literature on VC policy and its justifications. It has profiled the principal agent and evolutionary perspectives of the firm and discussed their implications for venture capital. Finally it has outlined and contextualised the research question, and presented the theoretical framework that will be used to answer it.

The following chapter will discuss the research design and methodology used to operationalise this framework, enabling the answering of the research question. It will discuss the selection of the cases and the techniques and methods used to collect the data. After that chapter subsequent chapters will present empirical evidence that helps to build the argument and framework outlined above.

## **Chapter 3: Operationalising the Research Framework**

### *3.1 Introduction*

The previous chapter presented an exploration of the empirical, theoretical and policy research in which this thesis is grounded, and discussed the research framework that will be employed in this thesis. The thesis seeks to compare the role of policy in the emergence of the VC sectors of the UK and US, and explore the ability of the principal agent and evolutionary perspectives to explain the differences between the emergence of the two nations' VC sectors. In order to do this we must take the research question of the thesis, which asks what role policy has played the development of VC sectors in the UK and US, and operationalise it into a testable form. This chapter will discuss the process by which the research question was examined and carried out. Section 3.2 will discuss the choice of research method and framework for executing a methodology with multiple units of analysis. Section 3.3 will discuss the selection of venture capital as the sector on which the study will focus, and the selection of the national cases of the UK and US. Section 3.4 will discuss the execution of the research, and Section 3.5 will summarise and conclude.

### *3.2 Research design and method*

The research question for this thesis has at its base the comparison of the role of policy in the development of two national venture capital sectors, and the ability of two theories to explain the differences in the development of those sectors. Answering the research question will require a means to execute a comparison of the cases, and a theoretical lens through which to view them. These will now be discussed in sequence. The comparison of the cases will be done via two contrasting cases. The first case, that of the US, will serve as context for the extended discussion that follows of the case of the United Kingdom. While the US case primarily focuses on historical texts, the UK case will combine historical texts, qualitative data and quantitative analysis.

The research question will finally be answered by analysing these contrasting cases in the context of the theoretical perspectives discussed in Chapter 2. It will use the notion of a 'boundary object' as a means by which to suggest that different theoretical framings may provide different explanations or results.

### **3.2.1 Research design: Multiple cases**

In order to produce theoretically and empirically sound insights into the comparative role of policy in the VC sectors of the UK and US, a basis must be established for the context of the comparison. The research question adopted for this thesis focuses on the examination of two empirical cases, the UK and US, and we first seek to draw a comparison of these. The focus on the role of policy in the emergence of these national cases necessitates the use of an historical approach to the initial aspect of the research question.

If the main units of analysis are national sectors, there are a range of other institutional variables that impact a sector and whose impact must be considered, including (among many others) firms, financial institutions, systems of corporate governance, and stock markets, not to mention path-dependent historical factors. In light of this it becomes clear that the unit of analysis is inexorably linked with a sizeable number of other variables. This makes it difficult to determine the boundary between the phenomenon we seek to measure (impact of policy on development of VC) and the external context. In light of this it is ideal to utilise a case study methodology (Yin 1994 p. 16). This approach allows researchers to utilise multiple levels of analysis to examine a given topic. Consequently this approach also gives significant flexibility in research method, which will allow for a more nuanced approach to understanding the impact of factors such as those discussed above (Basse 2001 p. 7). Beyond this, an embedded approach of case study methodology allows the examination of multiple sub-units of analysis (Yin 1994, 41-2), for instance the three types of relationships (VCs and firms; VCs and funders; and VC-backed firms and markets for exit) in which venture capitalists engage, as discussed in Section 2.3.

Given the comparative nature of the research question, a multiple case study approach is particularly appropriate (and not only because multiple cases are generally regarded as being more robust than single case studies, see Herriott and Firestone 1983). By adopting a multiple-case study of the emergence of the VC sector in two national economies, the thesis will seek to generate a comparison that will facilitate a comparison wherein the contrasting results may be explained by theory (described by Yin (1994 p. 46) as *theoretical replication*).

With the adoption of a multiple case method, it then becomes important to consider the relative theoretical positioning of these two cases in relation to each other. Eisenhardt and Graebner (2007 p. 27) identify this as the issue of 'theoretical sampling'. The position of the two cases in this thesis is particularly relevant as direct comparisons are necessarily difficult due to the range and intangibility of variables discussed above. As discussed in section 2.6.1, there is an ongoing debate about whether the case of the successful US VC sector can necessarily be extrapolated to other national contexts. Beyond this debate, it is clear that policymaking in countries outside the US is done in the context of the success of US in this area, which has been extraordinarily well-documented. Given these facts, the model of theoretical sampling employed in this thesis will use the US as a contextual case; while the case of the US is not itself the focus for collection of empirical data, an understanding of the development of the US VC sector provides the context required to understand the subsequent case and analysis. From here, the case of the US may be used to contrast with the vastly different outcomes seen in the UK, which is the main focus of empirical data collection. This model, of the contextual case informing the main case for empirical data, is line with Flyvberg's (2006) discussion of the importance of context-dependent knowledge in cases; policymakers in the UK have operated in the context of US success, and therefore in order to understand the development of UK policy we must also be aware of this key contextual factor.

In order to develop a clear understanding of the role of policy in the development of the UK venture capital sector, a detailed approach must be taken. A purely qualitative approach may provide some insights, but the use of quantitative

techniques has the potential to support and validate assertions made in the qualitative analysis. However this method is not without challenges. The following subsection will discuss the implementation of a mixed-method design for the case of the UK.

### **3.2.1.1 Research design: Mixed-method cases**

While the initial contextual case of the US will largely be drawn from historical sources, the discussion of the case of the UK will draw upon both qualitative and quantitative techniques. In this case Cresswell's (2003 p. 215) discussion of the qualitative sequential mixed method approach is employed as a general template. In this case, quantitative methods are used to provide empirical evidence for assertions drawn from quantitative data, rather than to generate the results themselves. This therefore allows us to use quantitative techniques to support broader, more qualitative assertions that quantitative methods alone might not be able to provide (or that qualitative methods might not be able to adequately support).

For this thesis, the initial conclusions regarding the UK will be supplemented with quantitative material on the distribution and performance of UK government-backed schemes to support investment in small firms. The complete dataset of all investments made by the Venture Capital Trust scheme and an accompanying dataset of investments made by approximately six other schemes will provide empirical support for the qualitative assertions made about the role of policy in shaping the UK VC sector. They will also further provide an empirical foundation for the theoretical interpretation of the data.

### **3.2.2 Research design: Theoretical interpretation**

Given the desire to adopt a theoretical replication approach (as discussed in Section 3.2.1), in which theories are used to explain differences in outcomes, the thesis follows Nelson and Winter's appreciative theorising model (1982, p. 46). In doing this we use a realist perspective, using theory as a "tool of inquiry" (ibid)

that may be used to further our examination<sup>6</sup>. Given the theoretical perspectives informing the investigation, a more appreciative approach is more useful in this case, allowing us to use empirical data to inform theory (Balmer 1993 p. 55).

As discussed in Sections 2.5 and 2.6, this thesis seeks to compare the ability of two contrasting theoretical frameworks of principal-agent and evolutionary perspectives to explain the role of policy in the VC sector. Given the complexity of the data associated with these types of questions, the thesis uses a transformative approach to examination of empirical data (Cresswell 2003 p. 212) nested within the context of the multiple-case study approach. This approach in its typical form uses a theoretical lens in the interpretation of qualitative and quantitative data (see Benbasat et al 1987) that informs the analysis. However in this case we seek to compare the explanatory abilities of two theories, seeking to understand the strengths and weaknesses of both in explaining the empirical outcomes seen and discussed above.

The interpretation of the empirical cases in light of the theoretical perspectives will also be driven by the notion of the 'boundary object' (see Star and Griesemer 1989). The concept comes from sociology, and refers to commonly constructed ideas that individual actors acknowledge and act around, but which may be given different meanings by different actors. In the words of Star and Griesemer:

“Boundary objects are objects which are both plastic enough to adapt to local needs and constraints of the parties employing them, yet robust enough to maintain a common identity across sites. They are weakly structured in common use, and become strong structured in individual-site use... They have different meanings in different social worlds but their structure is common enough to more than one world to make the recognisable means of translation” (ibid p. 393).

This framework will be applied to the case of the UK, specifically in relation to the existence of 'equity gap' facing small firms. Chapters 5 and 7 will propose that the equity gap has served as a boundary object upon which actors and policymakers

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<sup>6</sup> This is in contrast to a 'grounded theory' approach, as in which the research is seen to have no preconceptions guiding research at all, and the empirics then drive the building of a theory from the ground up (see Strauss and Corbin 1998)

have mapped their own understandings of venture capital and small firm finance. If one accepts that there are theoretical perspectives that inform interpretations of the funding gap (and which subsequently inform the publicly-stated rationale for policies), then the thesis argues that changing theoretical perspectives (i.e. framing the issue from an evolutionary rather than principal-agent perspective) will result in crucially different interpretations of the areas of policy to be addressed. Further, it argues that the interpretations from one perspective may not be easily replicated by another.

### *3.3 Case selection and the venture capital sectors of the US and UK*

The research question focuses on the venture capital sectors of the US and UK, but the selection of VC and these national cases was driven by their unique capacity for providing insights about the relationship between policy, small firms and innovation. The following subsections describe the rationales for selection of these sectors to be parts of the research question.

#### **3.3.1 Selection of venture capital as a sector for study**

The decision to focus on VC drew upon a number of unique factors that make it an interesting area for the study of policy. First, venture capital represents an intriguing perspective on innovative firms in that its success as a sector is linked to innovation (as VC is most well-known for backing technology-based firms), but the sector itself does not directly harness technology. In other words, while its presence and success may be interpreted as a loose proxy for ‘innovativeness’ (however one chooses to define that term) in an economy, competitive advantage in the VC sector is not necessarily directly derived from any technical advantage held by VCs themselves. This means that issues such as national science output and R&D are less of a factor for the VC sector than they would be for a more technology-based sector.

Secondly, the decision to focus on VC may be characterised by the nature of assets within VC as an organisational form. Provision of capital by VCs is important, but apart from finance the remainder of the assets present in the VC sector are



intangible. This makes direct comparisons of the sector more difficult because the actual investment process itself becomes more inscrutable. Because of this it makes the area amenable to a theoretically-informed analysis; indeed one might argue that given the intangibility of the topic some element of theoretical interpretation is virtually required. This would make the analysis contained within this thesis even more relevant.

Thirdly, venture capital makes an appealing area for further study because of its high profile as a complex yet universal problem. The success of many VC-backed companies has made it a priority for governments and the topic has received significant attention in media and policy circles. Its prominence makes it easier to find materials and coverage of the sector, and its high profile means that there are also a range of perspectives from different stakeholders that are available that might have not been available for less prominent (or 'sexy') policy areas. These perspectives reflect a range of implicit theoretical interpretations, enabling the addressing and answering of the research question.

### **3.3.2 Selection of the US and UK as cases**

After adopting VC as the sector to be studied, finding suitable cases of VC sectors is the next priority. In this situation theoretical replication becomes particularly important. Given that we are seeking situations that produce contrasting results but for predictable reasons (Yin 1994 p. 46), the national cases used must be similar with significant national comparability.

If we seek to analyse the emergence of domestic VC sectors, there is a strong argument to include the US as one case. Given its large size and disproportionate success, its success, and especially that of Silicon Valley, has largely been sought to be emulated worldwide. There exists a rich body of literature discussing the US VC sector, again due in large part to its prominence. Given this, its history and definitive role in the creation of many of the largest VC-backed firms, the US VC sector makes a very useful benchmark for the analysis of another sector that has followed a different path.

Given these conditions and circumstances, the UK is a good complement to the case of the US. The two nations share a common language and similar culture, and both have a market-oriented system of capitalism. They are widely considered by scholars in the comparative political economy literature to represent a common 'Anglo-Saxon' form of capitalism (see Hall and Soskice 2002, Albert 1991). Beyond these similarities, the VC sector of the UK is recognised as being one of the largest, if not the largest, in Europe (see Jeng and Wells 2000), with this success attributed to its similarity to the US system (Black and Gilson 1998). The long history of the UK small firm investment sector is also useful for making contrasts with the case of the US. In addition to these theoretical factors for the UK, there are logistical and practical issues as well, especially considering proximity to the topic and resources required to study the area.

There are a number of other nations that could then be selected for a second case that have been rejected. Japan and Germany, despite large economies, have economies with very different structures and financial institutions, that make them unsuitable for consideration. Most other continental European economies may be disqualified for the same reason (although the VC sector has been successful in countries such as Finland, see Lumme et al 1998, Ali-Yrkko 2001). Australia and New Zealand, despite generally common economic structures, have relatively small VC sectors, and there are issues with proximity and access to data. Israel and Canada are also similar to the US and have flourishing sectors. However in many cases their sectors may be judged as 'too close' to the US in that they have relied on US markets (namely NASDAQ) for exit rather than their own domestic markets (see Avnimelech and Teubal 2006 and Cumming 2002, respectively), which are smaller than those of the US and UK. For both of these cases access and distance would be issues inhibiting further study.

### 3.4 *Operationalising hypotheses and data collection*

Analysis of entire sectors, particularly those as large and complicated as the venture capital, may be difficult, so an operational framework for examining the cases in this thesis will prove useful for structuring our analysis. Several of the broad overviews (see Gompers and Lerner 2002, Florida and Kenney 1987 p. 36) of the VC literature have framed the venture capital process in terms of a 'cycle' in which VCs raise funds that they invest into firms, which are then harvested and returned to investors, followed by the VCs raising more funds. This approach provides a useful heuristic for understanding the broad dynamics of the cycle itself, but is perhaps not the most useful method for analysing the success of a national sector. A cyclical approach considers the elements that lead to growth, but does not necessarily break those elements into their constitutive parts (especially in a comparative case, when one or more element may be weaker than others). It also does not easily enable an analysis of the dynamics of the markets that impact particular elements of the 'cycle'.

Instead this thesis will base its analysis on a framework suggested in Zider 2000 p. 135 and Mason and Harrison 2002 p. 430 (and also used as a framing device in Gompers and Lerner 2002) examining venture capital in terms of the relationships venture capitalists engage in. These sub-areas of research include the relationship between VCs and the firms they fund (including selection and structuring of VC deals); between VCs and the institutional investors who back them; and between firms and the markets for investment exit. These three areas, in addition to discussions of capabilities and value addition (some of which are part of the firm-VC relationship), will be discussed in relation to both cases.

The analysis of these areas will draw from a range of sources, as discussed below:

#### **3.4.1 Historical sources – United States**

The sources used in the discussion of the US sector include a number of histories of aspects relating to the sector. Reiner's (1989) doctoral thesis is an excellent and in many ways authoritative history of the early stages of VC in the US, and other first

person accounts, such as Hambrecht (1984) and Livingston (2007), and others have proved useful. Other histories including Ingebretsen (2002), Wilson (1985), Geisst (1997) and others were used as well.

In some cases policy and other original documents have also informed the examination of the case of the US. These were in some cases obtained from government departments or otherwise from libraries. Additional library work for collection and analysis of policy documents was carried out at the Library of Congress in Washington DC and the Stirling Evans Library at Texas A&M University.

The discussion of the US sector also involved analysis and incorporation of existing scholarly literature on the topic. The US VC sector has been very widely studied, and as such the literature surrounding the topic is deep and wide. The review of the literature began with readings of some of the key authors on the US sector, especially Josh Lerner and Paul Gompers, and radiated out as further dynamics were explored. Tools such as Web of Science, ISI and Google Scholar were used to identify key contributions to the literature.

#### **3.4.2 Historical data collection - UK**

The UK VC sector has been well-studied but considerably less extensively than that of the US. Given the particular importance of historical data for judging the comparability of the two sets of theories discussed in the Chapter 2, great attention was paid to the collection of a wide range of sources.

Several existing histories of the UK's system of finance for small firms, especially during the period around the Macmillan Gap, were useful in informing the analysis. These include Lonsdale (1997) and Thomas (1978). Coopey and Clark (1995) was especially helpful in that it is two texts in one: the first half is a history of ICFC/3i, while the second half is a personal perspective on the history and nature of the organisation from a past CFO.

While histories were helpful for forming context, original documentation was used wherever possible to fill out and provide useful contextual information. These documents were obtained from a number of libraries and other reference sources, including the British Library, LSE Library, Cass Business School Library and Guildhall, all in London; the Financial Services Authority; the National Archives at Kew; the University of Brighton Library; the University of Sussex Library; and the Keith Pavitt Library at SPRU. From these sources a range of original historical and policy documents were collected. In addition they provided the basis for an extensive examination of the financial media over the past thirty years, which has also proved quite helpful. Historical archives of broadsheets including the *Financial Times*, *The Times*, *The Guardian*, *The Daily Telegraph* and *The Independent*, as well as other business-oriented periodicals such as *Director* and *The Economist*, provided period perspectives on the success and emergence of the VC sector. In addition annual reports and securities filings of relevant firms and organisations were examined in some cases.

The historical analysis also included extensive examination of policy documents, with particular reference to documents relating to small firm policy since 1979. While useful histories, for instance Lonsdale (1997) provided guidance to policy documents and issues between 1979 and the early 1990s, a gap was identified in the history of policy from the mid 1990s to the present. Therefore a range of documents from this recent period were collected from government agencies and other stakeholders, including the DTI (and later BERR, DIUS and BIS); HM Treasury; the Bank of England; Lords Select Committees; the London Stock Exchange; the Royal Society; the Confederation of British Industry; the Federation of Small Businesses; and others.

In addition, a number of interviews were carried out to provide background to the insights being generated from the historical examination. These were less systematic than opportunistic, designed to fill gaps in knowledge and provide contextual understanding to inform the history being discussed.

### **3.4.3 Empirical data collection - UK**

As discussed above, there are benefits to historical analysis on its own, but there are also great merits in the incorporation of new empirical data, especially in the generation of policy-relevant results. Therefore several forms of empirical data were collected.

The main empirical contribution comes in the form of two proprietary datasets. The first dataset was hand-collected by the author for the purposes of the thesis. It focuses on the investments made under the Venture Capital Trust scheme. Under the establishing rules of the VCT scheme, all trusts participating in the scheme must be listed on the London Stock Exchange. On this basis, securities filings were accessed via the Financial Services Authority and augmented with the Thomson One Banker database. This allowed the creation of a database containing every investment made by every venture capital trust from 1995 to early 2006. The dataset was cross-referenced with the Trustnet database ([www.trustnet.com](http://www.trustnet.com)) to ensure completeness. Full details of the collection of this dataset and those below are discussed in Chapter 6.

The second dataset was collected as part of a project discussed in Nightingale et al (2009). This dataset used the commercial Library House database as the basis for an analysis of policy interventions made largely since 1998. It includes investments made by Regional Venture Capital Funds, Early Growth Funds, University Challenge Funds, Enterprise Capital Funds, and regional schemes for Scotland, Wales and Northern Ireland. These investments were cross-referenced with documentation from the original funds to ensure validity. The dataset used in this analysis also includes several variables that were not used in the Nightingale et al (2009) study, and includes some cases that were not included, including a number of Northern Irish firms.

These two datasets were finally combined to provide a single dataset examining all UK government-backed investments in these VC-style schemes since 1995. They were then analysed to provide insights on the impact of changing government models of finance.

### 3.5 *Conclusion*

This chapter has presented the research design used to address the research question and theoretical framework. It discussed the adoption of the contrasting case study approach, whereby the historical case of the US will be used to provide context for the subsequent in-depth empirical discussion of the UK. The discussion of the role of policy in the emergence of the UK VC sector will draw upon historical and qualitative data to generate assertions that will then be explored using quantitative data from a unique new dataset. These will then be examined in a transformative lens to make judgments about the effectiveness of different policy rationales. The chapter explained the selection of cases, including venture capital and the national cases used in the thesis. It finally provided details of the collection of the data used in the thesis.

The following chapter will begin our direct empirical evidence by discussing the factors that drove the success of the US. It will argue that the historical path reflected networks, government intervention and unique capabilities that allowed the US sector to grow and thrive.

## **Chapter 4: The Emergence of the US Venture Capital Sector: Toward a Capabilities Explanation**

### *4.1 Introduction*

The previous chapters have presented the background and framework for the research question in this thesis, as well as the means and research method by which they will be operationalised. This chapter provides a discussion of the emergence and success of the US VC sector, which will provide context for the subsequent discussion of the case of the UK. Primarily using existing literature, it will argue that extensive government intervention and local coordination helped support the emergence of the VC sector, although the US government has been more inclined to support supply and demand for capital, rather than directly intervening in the market for VC. The chapter then presents a capabilities-based perspective that may give a more nuanced and useful explanation of the US sector's success, and identifying specific industry level dynamic capabilities that have been important to the success of the US sector.

The chapter begins by presenting a brief history of the US VC sector in Section 4.2. It then discusses the importance of network effects in driving demand in Section 4.3. Section 4.4 discusses institutional factors affecting the market for exit. Section 4.5 provides an overview of US government interventions in support of the US VC sector. Section 4.6 identifies and discusses several dynamic capabilities (as well as routines or non-dynamic capabilities) that have driven the success of the US sector. Section 4.7 summarises and concludes the chapter.

### *4.2 The US venture capital sector: A brief history*

It is tempting, and indeed quite common, to view the venture capital sector of the US as a single, monolithic entity revolving around Silicon Valley. However we also know that US VC is also heavily concentrated in regions, including but not limited to Silicon Valley in northern California and the Route 128 region near Boston. This section will discuss the emergence of the VC sectors in these cases, arguing that VC,



as an organisational form, did not but was the result of different sets of iterative learning processes by early venture capitalists. This, combined with path dependent issues and regional effects, mean that the concept of a 'US venture capital sector' is more of an aggregation of several regional subsectors than any one coherent industry.

#### **4.2.1 The first venture capitalists: AR&D and the emergence of VC as an organisational form**

The period during and the decade immediately following the Great Depression had a significant impact on the development of the market for risk capital in the US. The stock market crash of 1929 had in part been due to speculation regarding technology stocks, resulting in a backlash against technology investments (Hsu and Kenney 2005 p. 4). These economic struggles came at a time when the nature of investment and wealth was changing and professionalising. The introduction of financial and tax reform as part of the New Deal taxed corporate profits and introduced progressive taxation for the wealthiest Americans (Reiner 1991, p. 196). At the same time the emergence of investment trusts (now known as mutual funds) had resulted in more private funds being professionally managed, which resulted in greater focus on blue chip stocks and avoidance of riskier investments (Geisst 1997 p. 184-185). This resulted in concerns about the future of US national economic competitiveness, as expressed by the investment banker Jean Witter in 1939: "No one in the high income tax brackets is going to provide the venture capital and take the risk which new enterprisers and expansions require, and thereby help create new jobs, if heavy taxes take most of the profit when the transaction is successful" (Reiner 1991, p. 201).

The situation in New England during this time was particularly bleak. Employment in textiles and manufacturing fell by more than 75% from 1919 to 1940 as Midwestern economies surpassed New England by exploiting new modern technologies to manufacture industrial goods (Lazonick 1991, p.34-36). Efforts had been made in New England to address the issue of innovation and competitiveness in the past. Local efforts had included a Boston Chamber of Commerce-backed industrial development corporation in 1911 and the creation of the New England Council (NEC), which had concluded that long-term equity capital

was required for small firms to grow and succeed (Hsu and Kenney 2005 p. 8-10). In 1939 it established a committee that sketched out the initial outlines of what would become the venture capital business model (ibid). This resulted in several attempts to create different businesses around this model, including the New England Industrial Development Corporation (NEIDC), which was based on firms paying to be evaluated and considered for funding; and New Enterprises Inc, which provided potential angel investors with information about small firms (Reiner 1991 p. 208). None of these schemes were successful.

More successful was the effort of a group of prominent Bostonian businessmen and academics (including General Georges S. Doriot of Harvard Business School and Karl T. Compton, president of MIT) to create a new type of firm that would make investments rather than simply identify worthy firms (Florida and Kenney 1987a p. 132). When they launched American Research & Development Corporation (AR&D) in 1946, they claimed they were not simply starting a firm, but an entire industry (Hsu and Kenney 2005 p. 10). Their effort was driven not simply by a profit motive but also by a philosophical drive to eschew more high-profile, profitable investments to support small firms (ibid p. 16-20).

AR&D was organised as a traditional company, with shareholders and expectations of dividends (Reiner 1989 p. 179). In order to avoid the recently tightened US rules on investments trusts, AR&D was required by the SEC to find minimum levels of institutional investment (ibid p. 175). With a stated goal of raising \$5m and a minimum of \$3 million, the company only raised just over \$3.5m, primarily from life insurance companies, investment trusts, and university endowments (Hsu and Kenney 2005 p 12-13).

The demands of shareholders and dividends meant that AR&D's first few years were turbulent as it struggled to return a dividend to its shareholders (Reiner 1989 p. 179), AR&D began to focus more on early stage firms and more technology and especially computing and information technology. Its most famed investment, in Digital Equipment Corporation, or DEC, skewed AR&D's performance significantly when an initial investment of \$70,000 in 1957 became a final gain of

\$355 million in 1971 when the stock was finally distributed (Gompers and Lerner 2001 p. 146). The significant gains from the DEC investment meant that AR&D was able to show strong returns, thus validating the business model.

With the VC business model validated, other Boston financial institutions began to join the VC market in the early 1960 (Wilson 1985 p. 33-4). The emergence of the limited partnership (LP) form in 1959 (Lerner et al 1998 p. 152) allowed these problems seen in AR&D to be better addressed by giving GPs control without the demands of regular dividends. It also solved a problem of compensation, in that the Investment Company Act of 1940 mandated that managers of publicly traded investment companies (including VC and SBICs) could not receive any form of performance-based compensation (Liles 1977 p. 73-82). This incentive had led to an exodus of AR&D staff to rival firms that could offer compensation that AR&D could not. (see Kenney and Florida 2000 p. 132-3).

#### **4.2.2 Silicon Valley and the emergence of critical mass in California**

Parallel to the development of AR&D and the new firms in the Boston area, another cluster was emerging in California. The state had greatly benefited from defence industries during the Second World War, but there were concerns that the region would slide back into recession or depression once the war ended (Markusen et al 1991). Initial reports (see Wendt 1947 p. 43) found that investors had difficulty purchasing equity shares in technology firms because firms like Hewlett-Packard were reinvesting their earnings and not taking any equity investment at all. In this period groups of investors began to form, initially making investments for reconversion activities (Reiner 1989 p. 205) but later increasingly in the new small technology-based firms that were beginning to emerge in the area.

The success of Hewlett-Packard and other firms such as Ampex and Raychem established to investors that Californian technology firms could be profitable (Bowes, quoted in Reiner 1989 p. 228-9). Despite this, investment in the area remained largely informal. The introduction of the SBIC scheme (see Section 4.6) began the process of formalisation of these links as informal groups of investors began to form or join SBICs (Florida and Kenney 2000 p. 107).

Perhaps the defining moment in the burgeoning history of Silicon Valley was the formation of Fairchild Semiconductor in 1957. Displeased by the workplace and management at Shockley Semiconductor Laboratories, eight Shockley staff left the firm to start their own business (Lecuyer 2001 p. 666-672). Drawing funding from a New York investment bank (whose manager of the deal, Arthur Rock, founded the first Silicon Valley partnership in 1961, *ibid* p. 182), Fairchild took up contracts to produce electronics for the B-70 bomber project (Lecuyer 2000 p. 168) and became a significant success. However Fairchild's founders learned the lesson of the importance of equity and control rights as, once the firm began to reach its growth targets, a clause in their contract with their parent company allowed Fairchild Camera to purchase the owners' shares at a low price (*ibid* p. 170). Disenchanted by the experience several of the founders left the firm to found their own companies. These 'Fairchildren' went on to found several key Silicon Valley firms and institutions, including Intel (Robert Noyce and Gordon Moore), Amelco (Jean Hoerni, Sheldon Roberts and Jay Last), and the venture capital firm Kleiner Perkins (Eugene Kleiner). Beyond this they proved to be the foundation for the networks that would later emerge in the sector.

Through the 1960s the VC sector began to grow and develop as it professionalised. More firms dropped the SBIC business model and became limited partnerships (LPs) (Fenn et al 1997 p. 13-14). The sector was beginning to flourish, producing good returns as exits became more plentiful. Following the Fairchild experience, VCs began to develop the models and incentive structures to ensure that entrepreneurs would be able to retain equity stakes in their firms (Kenney and Florida 2000 p. 111). Entrepreneurs who had founded firms, such as Eugene Kleiner, also began to establish their own VC firms, using their own experience as a means to assess and add value to investments. By 1969, riding the highly buoyant IPO market<sup>7</sup>, VC LPs raised \$171m, and as the sector professionalised around the LP model, the National Venture Capital Association was formed in 1973 (Fenn et al 1997 p. 14-15).

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<sup>7</sup> Ibbotson et al (1988) note that in 1969 there 548 IPOs raising \$5m or less; from 1973-1975 there were only 81.

As the sector began to professionalise and grow, in 1974 another hurdle emerged as Congress enacted a new law, the Employee Retirement Income Security Act of 1974, covering pension fund management, banning fund managers from investing in funding opportunities that a ‘prudent man’ would find too risky (see Gompers et al 1998 for a more in-depth discussion). Managers of pension funds were banned from investing in venture capital or other high-risk assets, and those who violated the provision became personally liable for any resulting losses. This was of great concern to the VC industry, where the newly-formed NVCA lobbied intensely for the passage to be relaxed (Lazonick 2008 p. 11). The resulting change in the ERISA laws, and the fight against subsequent proposed changes a few years later, created an enormous market for the high-risk, high-reward services that VCs offered.

#### **4.2.3 The VC sector in a post-ERISA world**

With the ERISA policy changes, the nature and composition of the VC industry began to shift rapidly. Whereas family investors had made up 32.2% of the funds provided to the sector in 1978, by 1984 they made up 13.4%. At the same time, pension funds rose from 14.8% to 35.5% of the investment (Florida and Kenney 1987a). Venture capital fundraising grew enormously with the change of the ERISA rule. Whereas 1978 saw VCs raise around \$200 million, by 1982 that number had jumped to well over \$7 billion (ibid). This enormous expansion of funds available for investment distorted the market in two ways: first in terms of the time horizons for investment, and secondly in terms of capital available.

While the VC sector grew significantly, LPs began to form with the aim of executing equity deals explicitly for non-venture funding opportunities. This period of sectoral transformation led to the divergence of the sector into two forms, identified by Bygrave and Timmons (1992, p. 31) as “classic” and “merchant” venture capital. “Classic” VC was the traditional, small-firm focused practice of investing in firms with the potential for exceptional growth, as had been developed by AR&D and the founding fathers of Silicon Valley. “Merchant” VC focused on asset-based and lower-risk ventures, and tended to make deals involving management buy-outs (MBOs, widely known at the time as leveraged buy-outs),

management buy-ins (MBIs) and other variations. The potential for high returns with lower risk in this “merchant” model of VC soon became apparent to investors, and it quickly superseded the “classic” VC sector. The single partnership raised in 1987 by Kohlberg, Kravis and Roberts, at \$5.6bn, was almost twice the \$3.97bn raised by the entire VC sector in the same year (Fenn et al p. 22-24). Gompers (1994) shows that from 1980 to 1988, seed and start up investments dropped from 25% of total investments to 12.5%, while leveraged buyouts rose from 0% to 20%.

Despite the growth of the “merchant” VC sector, there was also substantial growth in the amount of funds flowing into “classic” VCs as well. The result of this was heavily distorted competition within the sectors receiving VC investment. Consequently this created gluts of funding that were beyond what the number of firms on the market could bear, leading to underwhelming returns. Sahlman and Stevenson (1986) describe the role of venture capitalists in the Winchester disk drive industry, into which VCs invested \$400 million. This resulted in a bubble, with twelve publicly traded disk drive firms with a combined market value of \$5.4 billion and a price-per-earnings ratio of almost 50. Unsurprisingly, the bubble soon collapsed and intense competition among those that survived led to a 98% decrease in income (ibid p. 22). This bubble phenomenon was repeated most famously in the cycle from 1998-2001 when the sector reached an incredible bubble, as documented in Lerner (2002).

#### **4.2.4 Models of VC in the US: Beyond Silicon Valley**

The growth and increasing professionalisation of the US venture capital sector discussed above saw it transition from a handful of disparate investors into a large, highly capitalised and politically organised sector. However it would be fallacious to assume that the story of Silicon Valley is synonymous with the rest of the sector. Venture capital in the US has been and indeed remains highly regionalised (see Powell et al 2002). While the ‘US VC sector’ is widely characterised as being particularly dynamic and successful, in many cases the dynamism attributed to the US sector as a whole actually relates to a generalisation of the case of Silicon Valley

to the entire national sector. However it is not necessarily accurate to characterise the dynamism seen in Silicon Valley as ubiquitous throughout the US sector.

There is, in fact, evidence of considerable heterogeneity among the sector. For instance Route 128 has been argued controversially to have a different model of VC by Saxenian (1994). In her study of Silicon Valley and Route 128, Saxenian identifies a culture of conservatism and risk aversion in the Boston area, exacerbated by older and less technically knowledgeable investors (*ibid* p. 64), and a “[lack of] internal cohesion or strong ties to local industry” (*ibid* p. 65-66). By contrast, these were strong in Silicon Valley, which fuelled the highly fluid labour markets discussed in the next section. The conservative business culture in Boston has been argued to lead to a phenomenon identified in Owen-Smith and Powell (2005) and Porter et al (2005) where biotechnology firms in Boston will target known and identifiable markets, while Silicon Valley firms will “swing for the fences” (*ibid* p. 263). Similar variation between the Boston and northern California models of VC and firm support have been discussed in Bresnahan et al (2001) and Owen-Smith and Powell (2004).

Beyond the most commonly studied sectors in California and Boston, Florida and Kenney (1987a) and Powell et al (2002) discuss other regional VC centres, including those in Chicago and Texas, which have thrived while largely serving local needs. For instance, the Chicago sector was largely driven by funds directly linked to financial institutions such as Allstate Insurance and First National Bank of Chicago, rather than independent outfits, which impacted the investment patterns in VC in the area (see Bylinsky 1976 p. 26-7). Relatively little is known about specific differences in practice in these non-Silicon Valley or Route 128 VCs, however the limited evidence available implies that their operations are impacted by considerably different organisational contexts.

If we consider these variations, the extent of which remains rather unclear (particularly given the tendency among academics to use VC data aggregated from across the US), it is important to identify what is meant in this discussion of venture capital in the US. While VC in the US is most often identified with Silicon

Valley, it is clear that Silicon Valley does not represent the entirety of the sector. However, given the widespread perception that the two are synonymous and this case's contextual role in the broader study, further discussion will broadly focus on the assumption that the US VC sector is broadly coherent, taking its lead from Silicon Valley and, to a lesser extent, Route 128. This is fitting as much policy work in the UK (and in the US) makes similar assumptions, although it is important to make clear that these assumptions are not truly reflective of the sector as a whole.

This section has discussed the extent to which the emergence of VC in both Boston and Silicon Valley represented a co-evolutionary, incremental process involving not only VC but firms and policy. It has also argued that regional variations make it difficult to identify a coherent US VC sector, and instead it uses a model based upon the broad perceptions of Silicon Valley and Route 128 as being representative. In light of this framework, the next section will address networks, which have served as a key driver of the co-evolutionary development of our understanding of VC in the US.

### *4.3 Networks as drivers of demand for capital*

In studying VC it is easy to assume that high quality firms were always ready and available for VCs to simply identify and then fund. Indeed, the demand for capital in the US has not been widely addressed<sup>8</sup>. In this section we advance an argument, adapted from Kenney and Florida (2000), that networks have played a driving role in developing and maintaining demand for VC funding. These networks, in locations such as Silicon Valley and Boston, have served as an “integral component of indigenous technology infrastructures” (Kenney and Florida 1987b p. 34). VCs have managed to play a key role in developing the networks that characterise these clusters, and have developed a means by which they are able to extract value from these networks. In this way they have managed to drive demand for capital via the continuing success of these networks.

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<sup>8</sup> This may be interpreted as being due to the natural counterfactual issues that arise when assessing demand in early-stage firms. This issue will be addressed in more detail in Chapter 6



#### **4.3.1 Network effects on demand: Labour volatility**

VCs have also been able to extract value from networks via the fluid labour market in these areas. Whether due to technology (Carnoy and Castells 1998) or network effects (Saxenian 1994 p. 54-55), labour markets, particularly in Silicon Valley, have been noted for their fluidity. Key to this fluidity is a high velocity with which employees move among firms, creating strong network effects (Benner 2002). Saxenian (1998, p. 24-8) discusses the role that informal social networks played in driving learning and information sharing in this context. These very flexible networks meant that, in the words of one engineer “....it wasn’t that big a catastrophe to quit your job on Friday and have another job on Monday” (Hanson 1982, quoted in Saxenian 1998 p. 26). This also facilitated the willingness of workers to take risks – if something didn’t work out they would just find another job elsewhere (McKenna 1989). Further, VCs took advantage of this in their personnel policies, using their existing networks to identify candidates for employment (Greenwood and Steier 1995, Hellman and Puri 2000).

#### **4.3.2 Network effects on demand: Sector specificity**

Following from the original groups of firms and institutional relationships, effects of sectoral lineage have emerged. The effects of lineage among the employees of Fairchild Semiconductor – or ‘Fairchildren’ – are significant. Castilla et al (2001) perform a social network analysis on the semiconductor sector in Silicon Valley and find empirical results that support this assertion: five of the founders of Fairchild each had more than ten links to other founders of semiconductor firms (p. 226-9). These initial network effects have led to a strong degree of sector specificity; the success of Silicon Valley and Route 128 has largely come in a limited number of sectors<sup>9</sup>, namely ICT (see Saxenian 1998) and biotechnology (Owen-Smith and Powell 2004, Powell et al 2002). This is due in large parts to the benefits of sector specialisation; traditional finance theory, which tends to overlook firm-specific capabilities, would call for distribution of risks by investing in a range of sectors. But a number of studies, including Bygrave (1987, 1989) and

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<sup>9</sup> More recently there has been evidence of increasing specialisation in ‘cleantech’ – low-carbon or renewable energy technologies – but this area is thus far relatively unexplored.

Norton and Tenenbaum (1993), have found that for VCs intense specialisation helps to better manage risks. This and other work (see Megginson 2002, Diller and Kaserer 2005, Kaserer and Diller 2008) suggest that knowledge specialisation allows VCs to make better investments due to a clear understanding of the sector. This specialisation allows networks to maintain flexibility, one of the key factors for the success of Silicon Valley, with this division of labour further allowing the sectors to survive external shocks to the market (Saxenian 1994).

#### **4.3.3 Network effects on demand: Universities**

The spillover impact of universities on clusters (and thus into networks) in these areas has been widely documented. Gibbons (2001 p. 213-215) identifies three ways in which universities (in Gibbons's case Stanford) support networks: by increasing technical advantage, educating entry-level professionals, and providing continual education. The development of technical advantage is naturally helped by the presence of multiple world-class universities in one small area (Stanford, UC-Berkeley and UCSF in Silicon Valley (see Jong 2006), and MIT and Harvard in Boston (see Etzkowitz 2002)). In this way success begets itself; the high level of investment by the US government into its science base (see Dosi et al 2007) comes to be directed more toward top universities with top faculty (Zucker and Darby 1996). These faculty members' own entrepreneurial efforts (see Kenney and Goe 2004) add value to the firms in which they participate (Zucker et al 1997). Further, university graduates provide human capital in the form of recent graduates who are then recruited by local firms (Cohen and Fields 2000, p. 5). Universities further honed those links by involvement in the sectors themselves, such as Stanford's Honors Program in the 1970s, which allowed area engineers to study for advanced degrees at flexible hours<sup>10</sup> (Saxenian 1994 p. 66-7), creating closer links between the university and industry, and bringing university research closer to commercialisation.

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<sup>10</sup> Saxenian (1994 p. 67) relates one Xerox executive's experience giving a seminar at the Xerox PARC facility that was widely attended by Stanford faculty. When giving a seminar at the Xerox facility near Boston, he found that no academics were present because they were not invited.

#### **4.3.4 Network effects on demand: VC and support activity participation**

Venture capitalists, given their key position within the broader networks (see Castilla et al 2000), have developed skills to interact with and take advantage of these networks. In this way Florida and Kenney (2000) suggest that VC participation in networks, particularly within Silicon Valley, has driven demand for capital by virtue of their participation. This leads to a situation where VCs are co-located with the firms they back (see Lerner 1995a, Stuart and Sorensen 2001), which works for both parties because the firms get access to VCs and VCs centralise their operations (although Powell et al 2002 suggest that as time has progressed and funds have gotten larger, VCs have become more likely to distribute their funds in other clusters as well). In addition, those VCs who are more networked than their rivals are more likely to be able to successfully exit, even when one controls for experience (Hochberg et al 2005); this suggests that, well-connected but inexperienced VCs are more likely to be successful than more experienced VCs with fewer connections. In this way they are able to leverage their networks to accumulate skills in the organisation. This view has also been suggested in relation to syndication by Brander et al (2002).

Networks were further developed by the emergence of financing and other support structures. Seeley Brown and Duguid (2000) and Atwell (2000) discuss the impact of shared communities of practice among these support bodies, citing accountants in particular. Similar importance (although with rather different conclusions) is found for the distribution of resources among Silicon Valley legal firms in Phillips (2003), and for commercial banks, consultants and other support roles in Kenney and von Burg (1999) and Dean (2000).

#### **4.4 *US government involvement in the emergence of the VC sector***

While the US government has played a crucial role in the development of the VC sector, its role has in some ways been rather inconspicuous. Rather than directly intervening in the operations of the VC sector, policies have generally sought to support it in more indirect ways. This has been done using supply- and demand-

side policies, which have influenced the market but still allowed the VC sector itself to generally develop in a market-driven, rather than government-driven, manner.

#### **4.4.1 Supply-side policies supporting US VC: The SBIC's two incarnations**

From its outset, the founders of ARD and the early East Coast VC sector had a strong unity of ethic in its investment philosophy. Underlying the AR&D rationale for providing funds to industry was the desire to prevent government intervention in the sector (Reiner 1989 p. 342). However the growth of the sector had begun to stagnate by the late 1950s, and the threat of Sputnik led the VC industry (such as it was at the time) to work with the government to design the Small Business Investment Act of 1958, which created Small Business Investment Companies (SBICs) (Fenn et al 1997 p. 11-12), which allowed companies to match private with public funds, and then deduct losses against ordinary income instead of counting them as capital losses (Reiner 1989 p. 279, 290-306). The programme proliferated in the late 1950s and early 1960s, before tailing off in the mid and late 1960s. Hsu and Kenney (2005) quote a Boston VC as saying that the venture capitalists of the day saw the programme as completely unnecessary – VC firms had plenty of undistributed capital available but the SBIC was injecting large amounts of untrained, inexperienced capital that would ‘crowd out’ proper investments<sup>11</sup>. However, as discussed in Section 4.2 it did help to drive the creation of the US domestic VC sector. In this way the scheme, it played a key role in the development and institutionalisation of the VC sector.

The impact of the programme was mixed. The cheap influx of US government-backed capital made SBICs very popular, and several had very large IPOs, often earning more in an IPO than the complete holdings of the existing non-SBIC VC firms at the time (Liles 1977 p. 122). But the boom in SBICs, spurred on by the bullish stock market (ibid) and general investor optimism in the potential of this new investment vehicle, soon began to run aground. The programme had several flaws, outlined in Fenn et al (1997 p. 12-13): first, SBICs were not strictly limited to providing equity, so some merely provided debt to profitable firms; second, they

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<sup>11</sup> This foreshadowed later arguments about the ‘crowding out’ of private funds by public investments, studied by Cumming and Macintosh (2006) and Leleux and Surlemont (2003), among others.

attracted individual, and not institutional investors, who in many cases were unaware of the risks; and finally the scheme did not attract the best investment managers. In 1966 an outgoing official at the Small Business Administration declared that the SBA was likely to lose \$18m because of “dubious practices and self dealing” (Liles 1977 p. 124). The official reckoned that 232 of the 700 SBICs were ‘problem companies’ (ibid). This tarnished the reputation of the scheme, and following a vigorous round of auditing, many firms left the market, with the size of the market dropping by more than two-thirds in 1966 to 1977 as VCs adopted the LP model (Hsu and Kenney 2005 p. 26-27, Fenn et al p. 13). Despite the widely held negative connotations of the programme, Reiner (ibid p. 280-282) argues that the SBIC programme, though not purely successful in creating technology investments (which only made up 3.5% of all investments), introduced institutional investors to venture capital. It also facilitated the adoption of the LP organisational structure, and the subsequently the professionalisation of the sector.

The scandal was not the end of the scheme. It was later transformed into a new programme with more controls that matched capital from the private sector with government funds, allowing these organisations to give both loans and equity investments, reducing investors’ risk profiles (Brewer et al 1996b). SBICs were able to fund their activities by issuing SBA-backed debentures, which is beneficial for SBICs that made debt investments. However it was more troublesome for those who used equity, as it created cash flow problems when SBICs attempted to service their debt (Brewer et al 1996a). Unlike VC, which had a strong skew toward the IT and biotechnology sectors (Lerner 1999 p. F78), SBICs served a broader range of the US industrial base, with 46% of investments made between 1983-1992 being in manufacturing, 17% in services, and 8.5% in communications and transport (Brewer et al 1996b p. 10). Of all investments in this period, only 2.7% were earmarked for R&D activities (ibid p. 9). The scheme also focuses on areas of the US that are not typically served by equity investors, with 26% of investments in 2007 being made in low-income areas (NASBIC 2009).

#### **4.4.2 Demand-side policies supporting US VC: SBIR, ATP, and the private accumulation of public rewards of research**

In addition to this support for the VC sector and its supply of capital, the US government has invested considerably in schemes that direct public funds to small firms in a range of ways, helping these firms to grow (Pavitt 1998). In doing this the government serves to drive demand for capital by helping firms survive the 'valley of death' (see Aurswald and Branscomb 2003) in which small firms exploiting new technologies may struggle. There have been several schemes designed to explicitly support small firms such as SBIR and ATP (for a more complete list see Lerner 1999 p. 287-289), while others have indirectly supported these firms by appropriating to firms the returns of public investment.

One key scheme behind US government support for small technology firms has been the Small Business Innovation Research scheme (see Cooper 2003 for a summary). The scheme requires that all federal agencies with significant R&D spending set aside a set percentage (1.25% originally, later 2.5%) of their funds to be awarded to small firms (*ibid* p. 294). Lerner (1999) shows that SBIR-backed firms were more likely to receive VC, but this was only the case for firms that were already located in technology clusters such as Silicon Valley, a finding supported by Gans and Stern (2003). The existence of the schemes has been found by Audretsch et al (2002a) to be linked to the formation of new firms and the decisions by scientists and engineers to enter the private sector.

Given the general success of the SBIR scheme in supporting firms, the Advanced Technology Program (ATP) sought to provide specific, targeted research that would have both technological as well as business potential. The scheme was founded in 1990 as a public-private partnership where firms with new technologies would approach the US government and request funding to exploit new technologies with technological and business potential (Hill 1998 p. 143-158). Unique in the approach to ATP is that while it seeks to address market failure (and Hall et al 2001 p. 91 suggest this is the case), it also explicitly considers spillover effects of investments as a criterion for evaluation (Mansfield 1996, Jaffe 1998). These effects do not just include market spillovers but also seek to encourage knowledge and networked spillover effects as well (Jaffe 1996 p.3). Further,

Feldman and Kelley (2001) find that firms receiving ATP funds actively seek to share findings and are engaged in networks. Darby et al (2003) find that the scheme has led to an increase in patenting among recipients of funding, and find that it is crucial for early stage firms seeking to exploit technology.

In addition to these, the US has invested significantly in R&D performed by universities and private firms (see Dosi et al 2006). An element of the high levels of investment has been the appropriation of returns to government-backed research by the private sector. Measures such as the Bayh-Dole Act have sought to give universities rights to the intellectual property they develop, with the aim of encouraging commercialisation of technologies derived at universities. The success of these measures has been widely questioned on grounds of effectiveness (see Mowery et al 2001 and Mowery et al 2002) and usefulness to the private sector (Florida 2000), not to mention concerns about the impact on the quality and directionality of university research (see Mowery and Nelson 2004 and Shane 2002). However despite these concerns the push to allow private returns to public investment has remained a crucial element of the US national science and technology policy<sup>12</sup>.

Another key element contributing to the technological growth, and indeed indirectly to demand for capital from small firms, is the ongoing US investment in military R&D. The US defence system has historically been based on highly complex systems that are more backward- than forward-looking (see Kaldor 1982). These complex systems have created demand for very specialised technologies, and these needs were often catered, especially in the early days of Silicon Valley, by small technology firms (such as Fairchild Semiconductor, as discussed earlier) (Nelson 1982 pp. 323-4). In so doing, military R&D has been argued to have driven many of the major technological breakthroughs (for instance computers and the internet) from which private US firms were able to ultimately appropriate returns from military investments (von Tunzelmann 1995 p. 245-6). The high level of military investment in R&D, by driving government

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<sup>12</sup> See Mowery and Sampat 2004 for an argument that the US model of technology transfer may be of limited usefulness in other OECD countries

investment in technology, has led to a variety of spillover effects (for instance labour and training), leading some (see Cypher 1987) to argue that military R&D has in a way served as its own *de facto* industrial policy.

These measures have all contributed to the backing of small firms, and have played an active role in driving small firm creation and growth. In this way even if the US government did not play an explicitly active role in the recent development of the VC sector, it may be understood to have been providing the support that allows firms to be ready for VC.

#### *4.5 Institutional factors and markets for exit in the US*

The US system has thrived in large part because there have been successful exit opportunities to VC-backed firms (Megginson 2002, Black and Gilson 1998). This is widely ascribed to the success of the NASDAQ market, although this section suggests there are underlying institutional factors behind this market success.

##### **4.5.1 The US federal systems and markets for verification**

One defining feature of the US government is its federal system, which constitutionally reserves the powers to regulate businesses to states, leaving the federal government only with the right to regulate interstate commerce (Lowenstein 1988, p. 100-101). Bush (2005) argues that this has led to a number of unintended knock-on effects. Among them the federal system has created a 'race to the bottom' among states competing to provide the weakest business regulations, so as to attract more corporate headquarters and taxation; this battle has historically been 'won' by Delaware, which has very weak regulations on business and corporate governance (see Cary 1974).

Beyond this, Bush (2005, p. 11) describes how the federal system has limited the scope of the US government to regulate fraudulent activity within the firm – in order for someone to be found guilty they must be proved to have both misrepresented a material fact and demonstrated fraudulent conduct, and *both* must be linked to a firm's resulting share price (ibid). The result of this, Bush



argues, is a market where managers have significantly greater scope for self-serving action whilst still being within the bounds of the law (ibid p. 14-15). The US Supreme Court has endorsed a view that views poor management as “a risk that any investor takes” (Court of the Eastern District of Virginia 2004, quoted in Bush 2005 p. 17).

This *caveat emptor*-based legal approach creates information asymmetries between shareholders and management, whose activity is unconstrained as long as it does not defraud secondary markets. These information asymmetries are unique and inform the US markets. Given that any manager may have self-serving intentions, we would expect to see markets for knowledge about firms and managers to emerge. The success of venture capitalists on markets like NASDAQ may also be explained in this light, as VCs are able to use their own reputational capital to bear in validating the quality of firms they bring to market (see Brav and Gompers 1997), driving the high valuations that lead to successful exits.

#### **4.5.2 NASDAQ and its success**

NASDAQ has benefited from specific locational and situational advantages as well, which has facilitated the emergence of exit markets for venture capital.

Prior to the foundation of NASDAQ the main options for firms wishing to make a public share offering were either the NYSE or one of the regional stock exchanges (of which the Chicago exchange was the most well-known) (Geisst 2002 p. 165). The 1960s had seen a rise in over the counter (OTC) trading, but this had been rife with fraud in the hyperactive stock markets of that decade (which had similarly facilitated the growth of the first iteration of the SBIC scheme).

In 1971 the National Association of Securities Dealers (NASD) launched the NASD Automatic Quotation (NASDAQ) system, which provided real-time quotes for OTC stocks (Ingbreetsen 2002 p. 61). The market grew slowly though the 1970s but experienced enormous growth as a new class of high-tech companies came up for IPOs, and the coffers of institutional investors swelled (ibid p. 92-3). With profitable new firms coming forward (and firms purchases in management buy-

outs being re-floated) and investors eagerly seeking the next big investment, NASDAQ flourished as it became clear that the market could sustain reputable firms. These large-scale successes enabled the development of NASDAQ's reputation, which then enabled additional benefits to emerge, as growth facilitated division of labour and specialisation in technology-specific areas, allowing NASDAQ to expand on its first-mover advantage, providing (at least in good economic conditions) the prospect of successful exit for VC investments (Lazonick 2008, p. 13-14).

Following the downturn of the early 1990s, NASDAQ soon became the epicentre of the dot-com bubble of the mid to late 1990s. Enough value was attributed to the technology-based firms listing on NASDAQ that aggregate household net worth grew by \$3 trillion in the fourth quarter of 1999 (Ingbretsen 2002 p. 223). By the time of the corresponding collapse of the market (although Pastor and Veronesi 2006 argue that what was seen in NASDAQ in the late 1990s was not necessarily a bubble). NASDAQ had become somewhat stigmatised for its role in the hype. Despite this, its IPO market did remain moderately successful through the mid 2000s until the economic downturn at the end of the decade.

Despite its associations with the dot com boom, NASDAQ's success also came from a number of other factors that complemented the firms being backed by VCs. Its electronic trading network means that without a headquarters, there were no local geographical biases towards the East Coast, which was positive for the West Coast-based Silicon Valley (see Reiner 1989 p. 392). In addition, because NASDAQ is a risk-orientated market within a nation with large internal markets, investors and fund managers see greater growth opportunities. The large size of the market for firms seeking IPOs therefore facilitates multiple large returns, creating scale economies within the market for investment (Ingbretsen 2002 p. 153).

In this way we can see that the markets for VC-backed firms were strongly aided both by the unusual corporate governance structure of the US, which seems to have facilitated risk, as well as the NASDAQ market, which due to the economic circumstances of the late 1970s and early 1980s was able to grow and develop

differentiated knowledge resources that further allowed division of labour in technical knowledge, allowing for fairer valuations of technology-based firms (albeit coupled with overpricing that is characteristic of NASDAQ and enabled valuable VC exits, Gompers and Lerner 2003).

#### *4.6 Framing VC in the US: A capabilities perspective*

The thesis has already discussed the widespread use of the principal-agent approach in the VC sector. This approach is useful in framing many of the major economic relationships in which VCs engage. However this thesis seeks to argue that a model based solely on principal-agent approaches is insufficient to explain the role played by venture capitalists. One topic which a principal-agent/contracting view is not immediately able to explain relates to organisational capabilities. Here we seek to identify capabilities and dynamic capabilities that have characterised the success of the US VC sector.

This analysis draws upon the discussion of capabilities in Section 2.5, and adopts Eisenhardt and Martin's (2000) definition of capabilities (or routines, or non-dynamic capabilities) as being prevalent in moderately dynamic markets; while dynamic capabilities are real, identifiable core processes that are simple and tacit and enable competition and success in changing markets. If we accept that venture capitalists add value to firms beyond an agency/contracting-based model, we may begin to flesh out a newer understanding of the role of VC in light of capabilities. Our historical discussion suits a capabilities perspective in that both the Boston and Silicon Valley VC clusters had their roots in one (AR&D) or a few (Kleiner Perkins, Rock, etc) VC firms. The diffusion of human capital from those original firms throughout the sector would support an argument that there are common capabilities found throughout the sector. In light of this, the remainder of this section presents capabilities, drawn from the literature, that seem to be crucial for VCs' success.

*Capabilities for screening and managing agency risk:* Although this is a core function of the VC sector, the process of screening has been identified to be

idiosyncratic (Macmillan et al 1986) and at least somewhat tacit (Kirsch et al 2009). Similarly, although agency risk is not the entirety of the VC-firm relationship, the management of risks associated with principal-agent issues remain important (see Gompers 1995, Amit et al 1998). In particular, structuring deals and learning from them remains a challenge (as with the experiences of the Fairchild employees who lost their equity stakes in the firm, Lecuyer 2000 p. 170). Although these capabilities may be common throughout the sector, their absence or poor application will have consequences for the firms they back. Despite this, it is unclear the extent to which these would represent capabilities or dynamic capabilities, given their more complex, analytical nature.

*Dynamic capabilities for extracting value from networks:* the chapter has already discussed the importance of networks in the generation of demand for capital (as suggested in Florida and Kenney 1987a). Given the importance of proximity for VC investment, we see clustering and agglomeration effects in the areas where VCs are concentrated (Lerner 1995, Sorenson and Stuart 2001). In these areas members of networks are able to use the networks, stemming from a fluid labour market (Carnoy et al 2007) as a tool to gain information on reputational capital (Saxenian 1994) and to identify managerial talent (Greenwood and Steier 1995). Further, the suggestion that network position may be as important or more important than experience in a sector (Hochberg et al 2005) reinforces the primacy of networks in the US sector. Further, one interpretation of the results in Brander et al (2002) would be that the ability to exploit networks is also key for the assembly of the knowledge resources required for firm growth. In light of this, the importance of networks, and VCs' abilities to exploit them, must be considered a dynamic capability in the VC sector.

*Dynamic capabilities for organisational learning:* Discussions by VC practitioners (see Hambrecht 1984, Kleiner 1989) suggest that the skills practiced by VCs are a craft that is learned. While these skills may be gained by individuals (and the result in Sapienza et al 1996 suggesting that experience is linked to value addition), learning through organisations and through sectors also seems to be important. The ability to learn, and then operationalise, those experiences in screening (Stuart

and Sorensen 2001 p. 1157) and value addition (Sapienza et al 1996) enable success, especially by incorporating networks, as discussed above.

*Dynamic capabilities for exploiting economies of scale:* In making their investments, venture capitalists also rely on their own generated economies of scale and scope. Because of institutional investors' willingness to back large VC funds (Florida and Kenney 2000 p. 141), the fixed costs of investing in the sector (screening and monitoring, as above) drive a growth in minimum efficient investment size as funds expand (Murray 1999). This means that rather than guaranteeing a firm \$2m, a VC will guarantee a firm \$15m, as long as it meets its targets; the additional funds provide the firm with the capital to grow and expand and cut its search costs when the initial tranche of funding runs out. Further, the large size of the investments means that VCs have more incentives to provide greater value-added services (as in Cumming 2004 and Section 4.3.4) to the firms they back, creating economies of scope in value addition. Further, if we accept an explanation of economies of scale as a driver behind fund size, demand-side government intervention (such as SBIR and ATP) becomes even more important as it provides firms with the funding to grow to the level where they may catch the attention of VCs. In addition, there also exist opportunities for exploiting economies of scale via the large size of the US market, which enables rapid firm growth and thus higher valuation of IPOs.

*Dynamic capabilities for assembling of complementary assets to create high value firms*<sup>13</sup>: Perhaps the most important of the dynamic capabilities developed by VCs in the US comes from the ability of VCs to identify and combine resources, and use them for growth. They may acquire these assets in a number of ways: through syndication (as suggested by Brander et al 2002); through changes in management – typically involving replacing the founder with a CEO with commensurate experience (Hellman 2002b); or through seats on the board (Lerner 1995), which then grants access to the makings of the firm's strategy (Fried et al 1998).

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<sup>13</sup> This idea originally came from Ed Steinmueller, whose insights are gratefully appreciated.

The skills VCs bring onboard with them facilitate a 'rush to professionalisation'. Kaplan and Stromberg (2000) found that 64% of VCs studied played direct roles in the shaping of the management team. Hellman and Puri (2000) showed that, controlling for selection bias, VC-backed firms were more likely to hire a vice president of sales than non-VC firms. Assembling these skills requires the ability to utilise and extract assets from personal networks (Powell et al 1997, Stuart and Sorensen 2001; Steier and Greenwood 1995). Once these skills are brought together, VC-backed firms bring their products to market faster than those without similar backing (Hellman and Puri 2000a).

Because of the rapidly changing market environment, successful VCs must be able to make quick, simple judgments about the assets that best allow them to build a high-growth, IPO-ready firm. Given the dynamic market in which VC-backed firms operate, the assets VCs will be assembling in order to bring a firm to IPO will likely vary over time. Consequently the ability to adapt to these changes will prove to be important both for the success of individual investments and the venture capitalist's portfolio and future activities. The resulting implication is that this dynamic capability represents the core of the VC-firm relationship, in that it represents the overlap of the capabilities and resources of the VC and the firm. These dynamic capabilities ensure that VCs are able to move from 'picking' winners to 'growing' them; and by taking these 'winners' to IPO allow VCs are able to generate the returns that have driven the success of the US sector.

#### *4.6 Conclusion*

This chapter has discussed the emergence of venture capital in the US and presented several factors that have played key roles in the success of the US sector that are not easily explicable under the principal-agent framework. It has shown the evolution of venture capital as an organisational form and has presented and has discussed the background for the emergence of the US VC sector. It has discussed the role the US government has played in fostering both supply and demand for VC activity. It has alternately identified key capabilities that have been

developed in the US VC sector. These capabilities also include the assembly of complementary assets to bring the firm to exit via IPO.

In light of this discussion, the following chapter will discuss the emergence of the VC sector in the UK, which has followed a very different path of development despite its relatively similar economy. It will discuss the extensive role of policy on the emergence of the UK VC sector, and identify several areas where the UK VC sector's development has been weaker than that of the US.

## **Chapter 5: Beyond the Macmillan Gap: Perspectives on the Emergence of the UK Venture Capital Sector**

### *5.1 Introduction*

The previous chapter presented a qualitative discussion for one of the two cases used to answer the research question. The chapter identified networks, government policy, means to exit, and especially capabilities and dynamic capabilities that have allowed the US sector to grow and succeed. This chapter provides a qualitative and historical examination of the second case, addressing issues surrounding the financing of small firms in the UK. The chapter will argue that the 'equity gap' in small firm funding identified in the early 1930s has become a 'boundary object', and that the UK has gone through changing interpretations of what the gap means. The perception of the gap as a market failure has been addressed by policymakers by government-backed institutions, tax incentive-based schemes, and more recently by increasingly nuanced uses of public and private capital together. The chapter also examines the development of the private UK VC sector, proposing a capabilities explanation of the sector's evolution. The chapter will discuss the emergence of secondary markets and their role in the challenges facing the VC and small firm finance. It will conclude by comparing and contrasting the cases of the UK and US, drawing some conclusions from these historical comparisons for further examination in the following chapter.

Section 5.2 will provide a history of the changing perspectives of the equity gap from its origins to the present day. Section 5.3 will profile the VC sector and its emergence, and Section 5.4 will discuss the challenges of exit. Section 5.5 will conclude the chapter and frame the quantitative discussion in Chapter 6.



## 5.2 *The 'equity gap' as a boundary object*

### 5.2.1 The Macmillan Gap and its context

The relationship between finance and industry in the UK has historically been rather uneasy<sup>14</sup>. In the nineteenth century banks had typically maintained close, cultivated relationships with the firms they backed. However in the 1870s a wave of bank failures (due in part to too-close relationships) triggered a massive amalgamation trend among banks (Ross 1990 p. 53). From 1886 to 1914 the number of joint-stock banks in the UK dropped from 109 to 38 (Checkland 1975, p. 532), and by 1917 five clearing banks held two-thirds of the resources of the entire banking system (Pollard 1992 p. 26-27). Although evidence is limited, it appears that the newly centralised banks reined in the local banking officials' authority, making loan policies more consistent and stringent (see Ziegler 1997 p. 190-191). Lavington (1921, ch. 31-33) documented that the banks actively avoided equity or long-term debt deals for industry, favouring instead short-term investment. However Michie (1981) argues that risky ventures still managed to find funding, even in the absence of other means of investments.

These changes, and the ongoing trend toward 'rationalisation', or increased coordination of industry, particularly among declining sectors (Pollard 1992 p. 53) led to the identification of a need for a thorough re-examination of the UK's economic system. The resulting Committee on Finance and Industry, chaired by Lord Hugh Macmillan, had a high profile (its members included J.M. Keynes) and broad remit (see Skidelsky 1992 p. 343-362). The committee took evidence from a broad range of participants in the economy, including both financiers and industrialists (ibid). The committee was largely focused on national issues of industry and monetary policy. However, ironically its most substantial historical impact would come from its passing reference to small firm finance, which was not a main area of focus:

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<sup>14</sup> Historians have debated whether financial institutions' refusal to provide funds for new equipment was a cause of the decline of the UK's economic competitiveness in the late 19<sup>th</sup> and early 20<sup>th</sup> century (see Payne 1978 and McCloskey and Sandberg 1971 p. 105-106). Whether this reluctance to invest in new stock was a result of conservatism or a lack of high-return investment opportunities (Michael 1981 p.158-160) is unclear.

“It has been represented to us that great difficulty is experienced by the smaller and medium-sized businesses in raising the capital which they may from time to time require, even when the security offered is perfectly sound. To provide adequate machinery for raising long-dated capital in amounts not sufficiently large for a public issue, i.e. amounts ranging from small sums up to say £200,000 or more, always presents difficulties. The expense of a public issue is too great in proportion to the capital raised, and therefore it is difficult to interest the ordinary investor by the usual method” (Macmillan report para. 404)

This finding was not surprising. The banks had suggested in their statements that they avoided any long-term loans for capital investments by firms (see Hyde 1930 Q889). And yet the extent and nature of this gap in funding (known at the time as the ‘Macmillan gap’ and later as the ‘equity gap’ or ‘funding gap’) has remained rather unclear, with later historiography debating its existence and context. One interpretation proposed by Michie (1990) was that the Macmillan gap “was only incidentally the problem of financing new manufacturing enterprise. More importantly, it was the question of what to do with long-established and once-successful firms that could no longer generate profits, had exhausted their reserves and were a poor risk for further lending” (p. 105). Ross (1990 p.52-68) suggested that the gap clearly existed but that banks obfuscated the committee’s efforts to characterise the provision of banking services.

Measuring the demand for capital is difficult, and the counterfactual difficulty in characterising investments that did *not* happen is particularly challenging (Ziegler 1997 p. 190-191). Despite this, the emergence of the Macmillan gap as identified in the report seems to suggest some shift in the supply-demand profile of firms in the period leading up to the late 1920s. Balogh (1950 p. 450) argued that technological change was driving greater economies of scale, driving down prices and increasing the minimum efficient size for firms. The resulting increase in demand for capital goods (which banks wouldn’t fund) led to the gap situation forming (ibid). This suggestion is supported by data in Henderson (1949) that suggest firms in the 1930s increasingly attempted to list on the new issues market at the minimum amount for listing, or less (p. 65).

Although the reality of whether any funding gap existed may be unclear *ex post*, the findings of the Macmillan Committee were eagerly received in the City by investors

who hoped to exploit untapped markets. Three institutions entered the market shortly after the publication of the results: Credit for Industry Ltd (part of the Bank of England-backed United Dominions Trust); Charterhouse Industrial Development Co. (backed by investment trusts, insurance companies and banks); and Leadenhall Securities Corp. (backed by a merchant bank) (Thomas 1978 p. 119-120). Charterhouse was part of an investment group that had been dormant since the stock market crash but identified a market opportunity with the Macmillan Gap (Ross 1997 p. 212). It made investments between £10,000-£100,000 for expansion of existing businesses (Thomas 1978 p. 120). It found much interest but limited quality; in its first week of business Charterhouse received 9000 applications for funding, but it only identified twelve of these as worth additional investigation (Dennett 1979 p. 40). Despite this entry into the market, William Piercy, future first chairman of ICFC, had noted in the late 1930s that the market had not been fully addressed and would require a more comprehensive, government-backed effort (Coopey and Clark 1995 p. 13).

### **5.2.2 Addressing the Equity Gap with Institutions: ICFC and its relations, 1945-1979**

With the publication of the Macmillan Committee's report and the contemporaneous financial collapse, the banking system proceeded to lend less than before, cutting lending from 55-60% of deposits to 40% as the depression wiped out banks' industrial lending portfolios (Pollard 1992 p. 117). This continued throughout the rest of the 1930s (*ibid*), as the war years saw much tighter controls on banking activity and minimal lending (*ibid* p. 176), the situation remained strained, with lending limited. Indeed, Scott and Newton (2007 p. 17-23) suggest the banks actively sought to maintain their monopolies by undermining any attempt to provide funds to small firms. Private investors were also discouraged from investing in industry due to the increases in taxes (Frost 1954, p. 196)

In this setting the founding of the Industrial and Commercial Finance Corporation (ICFC) in 1946 was designed to address these gaps in funding for small firms. Although the clearing banks were the main shareholders in the corporation, they

entered into the arrangement only reluctantly<sup>15</sup>, and agreed to the formation primarily as a means of preventing direct government intervention. By agreeing to be shareholders in ICFC, banks seemingly were trying to establish ICFC as a buffer between themselves and the government (Lonsdale 1995 p. 45).

However despite their hostility banks still were not actively providing debt capital to small firms. As the process of reconversion of assets to civilian purposes and Keynesian nationalisation developed, more emphasis was placed on ICFC and FCI (Finance Corporation for Industry), which were now seen as key sources for capital for UK firms (Coopey 1994 p. 263-265). From the policymakers' perspective, the role of ICFC and FCI were to provide "temporary or longer period finance for industrial business with a view to their quick rehabilitation in the national interest, thereby assisting in the maintenance and increase of employment" (Sir John Anderson, HoC Debates, Vol. 407, Col. 644). The role they were to play was then cast in the light of the supply of capital only. If the goal was to supply capital to quickly grow business (or, in the case of FCI, finance British reconversion to civilian activity (Hicks and Houghton 1958 p. 149)) and thus the overall economy, it was necessary for ICFC and FCI to take action quickly and not be overly selective. FCI obliged, accepting a vast majority of the one hundred applications it received in its first eleven years, distributing £150m in loans (Hicks and Houghton 1958, p. 153), whilst ICFC, engaged in political struggles, distributed its capital similarly eagerly, with consequently high losses (Coopey and Clark 1995 p. 37-45).

For ICFC and FCI, their roles as providers of capital to business and their business models came together as the higher-risk sources of capital for small firms. The ICFC business model in particular eventually grew to be based around the provision of a combination of debt and equity to firms – ICFC would provide as much debt as a firm could be expected to service, and equity for any funds required beyond that (Coopey and Clark 1995 p. 210). This hybrid debt/equity structure allowed ICFC to reap the benefits of equity while maintaining the

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<sup>15</sup> Lonsdale (1995 p. 45) mentions that some banks actively refused to provide referrals to ICFC, seeking to undermine its business before it grew; one bank provided only one referral to ICFC in two years.

security of collateral. At the same time, it maintained a strict non-interventionist ideology and sought not to interfere with the activities of owner-managers (ibid p. 211). If the problem was supply of capital, it was not within the aegis of ICFC to do anything else.

This approach to the funding gap – debt/equity combinations – successfully met the need of the companies in question whilst also ensuring that ICFC and FCI both maintained their independence without resorting to additional fundraising. This forced them to develop strong search and informational abilities to identify potential investments, realising that, in the words of one senior official in 1955, it

“cannot accept more than a certain amount of risk, for even though by the nature of its business it has many eggs in many different baskets, one cannot... assume that the risk run... is predictable and therefore not risky in the aggregate. For many of the things which may endanger one egg will endanger them all.” (Tew 1955, p. 224).

The risk assessment process focused on extensive due diligence and consultation with prospective investments (ibid p. 225-228), and investment in firms that were already profitable.

#### *5.2.2.1 The Radcliffe and Bolton Reports*

The topics covered in the Macmillan Report were followed up thirty years afterward in the work of a new committee, chaired by Lord Radcliffe, with the same remit as the Macmillan committee (Kaldor 1960 p. 14). As with the previous committee the Radcliffe group looked primarily at issues of monetary policy and the link between finance and the economy. The final report of the group, while unanimous (ibid), received mixed reactions (see Gurley 1960, who referred to its discussion of monetary policy as an ‘honourable failure’ p. 700). The Radcliffe Report’s discussion of the Macmillan gap was more favourable. It deemed ICFC to have largely filled the gap (Radcliffe Report 1959 para 827), although it also criticised banks for decreasing lending to small firms as ICFC grew (ibid). It suggested that the £200,000 ceiling for ICFC was too low and should be linked to “the lowest practicable amount for a market issue” (ibid para 956), allowing for future declines in the value of money (Thomas 1978 p. 123). Finally it

recommended the creation of an institution to selectively finance the development of new technologies (Radcliffe Report para 827). This was manifested in 1962 with the establishment of Technical Development Capital Ltd (TDC). Partially owned by ICFC and financial institutions, TDC was slow in making investments and was bought entirely by ICFC in 1968 to be part of ICFC's portfolio (Coopey and Clark 1995 p. 85-86).

By 1968 ongoing struggles of small firms led to increasing concern about the state of small firms in the economy and an official enquiry, chaired by J.E. Bolton, was established. The Bolton Report argued that ICFC was generally filling its intended role (Bolton Report 1971 para 151) but that banks were still being conservative in their lending, and small firms had little access to the stock exchange, despite their increasing capital needs (ibid para 155-156). It also identified significant information asymmetries between firms and banks and other institutions (ibid para 128). Ultimately, the report concluded that it seemed unlikely the decline experienced in the small firm sector would continue. Therefore it did not advocate instituting policy measures to specifically support small firms (ibid para 159 and Storey 1982 p. 9-10). However it did advocate policies to create more small firms to serve as a 'seedbed' for future firm growth (Bolton Report 1971 para 85, Beesley and Hamilton 1984)

#### *5.2.2.2 Small firms in the 1970s: National Enterprise Board and the Wilson Report*

ICFC had since grown to be a substantial provider of capital, growing from five branches in 1958 to eighteen in 1973, when it merged with FCI (Coopey and Clark 1995 p. 233-5). Renamed Finance for Industry, the new entity subsequently received a cash infusion of £1 billion from financial institutions to continue its work (Capie and Collins 1992 p. 66). The newly merged venture<sup>16</sup> targeted firms with high growth potential, but began to run the risk, identified in the Bolton Report, of 'creaming off' the best investments; in other words, it was meeting demand for capital, but only the 'best' demand. Later evidence presented in Storey and Wynarczyk (1985, p. 15) supported this, finding that mean profitability for ICFC/3i firms (15.9%) was twice that of a sample of Northern manufacturing firms

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<sup>16</sup> Referred to henceforth as its later name of 3i to ensure consistency

(8.5%). This made ICFC/3i very successful, but made other potential investors ambivalent about entering the market because of fears that ICFC/3i was simply 'creaming' off the best investments (Bates 1971 p. 169-171).

The cash infusion for ICFC/3i also brought the organisation into an unsettled political situation. The new organisation was feared by those on the left of the Labour Party to be a pre-emption of their planned National Enterprise Board (NEB), which was intended to be a replacement for capitalism in which central government would own and oversee provision of finance (Lonsdale 1997 p. 110, Coopey and Clark 1995 p. 124-127). When the NEB was ultimately formed it had a range of (sometimes conflicting) aims and motives, among them providing industrial finance for SMEs beyond ICFC/3i (Lonsdale 1997 p. 110). The small firm investment activity of the NEB was ultimately rather limited; it supported several early computer companies (for instance Insac and Nexos, which lost £6.9m and £34m respectively) but remained ultimately overshadowed by other financial institutions and the changing political climate (ibid p. 115-128).

The issue of small firm finance came to the fore again with the Wilson Committee of 1976. Although the final report (released shortly before the Conservative election victory in 1979) did not explicitly advocate a political mandate, it serves as a marker of transition between Labour ideas (for instance, an implied support for a National Investment Bank (Wilson Report 1979 para 948, Capie and Collins 1992 p. 71-2) and ideas that would be adopted by the new government. The Conservative election victory in a way represented the end of an era in which institutions were created to address policy problems; and the beginning of an era in which policies were designed to encourage the private sector to take particular actions.

### **5.2.3 Using markets to address the equity gap: Intervention in the Conservative Governments, 1979-1997**

#### *5.2.3.1 The Business Start-up Scheme and Business Expansion Scheme*

The new Conservative government pushed forward several schemes designed to support investment in small firms (including the Small Firm Loan Guarantee

Scheme, in line with Wilson's recommendations (Cowling and Clay 1995 p. 142)). The Business Start-up Scheme was designed to provide tax relief (at investors' marginal rate, usually 60%) for investments in small firms that had been in existence for less than five years, with up to 50% of the share capital in any company qualifying for relief (Lonsdale 1995 p. 70), in a manner that would encourage people to start their own businesses (Westhead and Storey 1996 p. 15). In this way, it was intended that market forces would do the job of distributing capital that a central institution would fill under the Labour plans.

The BSS scheme's simple design proved to be set up for failure. One investment organised within the scheme, Electra Risk Capital, invested £8m under the scheme in 32 technology companies, of which only one made a profit and the rest were liquidated or sold for considerable losses (*ibid* p. 71-2). After such high-profile failures, the BSS scheme managed to only raise £15m, instead of the £100m that had been expected (*ibid*).

Given that BSS was a novel form of government intervention with markets for the UK (i.e. incentivising private investment in otherwise undesirable areas), its lack of success is unsurprising. The successor to the BSS<sup>17</sup>, the Business Expansion Scheme (BES) took onboard some of the flaws of BSS when it was unveiled in 1983. The plan's stated aim was "to provide income tax relief for genuinely additional outside equity investment by individuals in certain types of unquoted UK trading companies" (Miller 1993 np). It offered heavy tax breaks of up to 60% to consumer investors on investments in small firms. The investments had to be in ordinary shares, and the amount that could be invested in one year was limited to £20,000, although this was later boosted to £40,000 (Harrison and Mason 1989 p. 149). Firms were not allowed to be listed on the London Stock Exchange or the new Unlisted Securities Market, but could be listed on the third-tier OFEX market (*ibid*).

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<sup>17</sup> The Business Start-up Scheme of the early 1980s should not be mistaken for the scheme of the same name that ran in the early 1990s. The latter scheme was originally known as the Enterprise Allowance Scheme (EAS), and provided a temporary subsidy for unemployed individuals who set up their own businesses, allowing them to claim unemployment benefit for one year after starting their business (Robson 1998 p. 202). The scheme was (confusingly) renamed the Business Start-up Scheme in 1991.



The BES scheme proved to be very successful – in the five year period from FY 1984 – FY 1988, over £720 million was invested in over 2500 firms<sup>18</sup>, which was significantly more than was raised by institutional VC in a roughly similar time period (Harrison and Mason 1989 p. 151). However there were serious structural flaws in the programme. Hall (1989 p. 51-2) identified several issues, including the generally large size of investments; a strong regional bias (42% of investments were made in the South East); and delays in the processing of tax rebates. However the chief problem was that while consumers embraced the tax benefits of the BES, their appetite for risk was extremely low, resulting in a boom in BES funds specialising in asset-based investments such as nursing homes and hotels (Lonsdale 1995 p. 72). Even after rule changes in 1984, similar concerns still remained. Directors of BES backed firms could not be paid for their services, raising concerns that this would prevent firms from bringing on high-quality boards (Willcock and Tharpar 1993 p. 6).

Beyond this, most BES investments were made in the three-month period immediately preceding the end of the tax year, skewing the seasonal availability of capital (Mason and Harrison 1989 p. 154) (and suggesting window-dressing behaviour, as in Lakonishok et al 1991). Investments had grown larger and more concentrated as the scheme developed (see Hoptof 1987 p. 24). In his 1988 Budget address, Chancellor Nigel Lawson suggested that the private VC market was meeting demand at the higher end of the market and announced a maximum investment size of £0.5, but also announced plans to allow the use of BES funds to buy property investments for rented accommodation (HC Deb 15 March 1998 cc. 993-1016). This move was portrayed by the government as a means to drive down rents and make housing more affordable, while the Labour opposition decried it, including the MP Gordon Brown:

Since the scheme was set up in 1983 – it was originally intended to provide tax concessions for high-risk investment in high technology industry to create jobs – Ministers have had to come to the House at least twice to say that,

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<sup>18</sup> Hall (1989) p. 51 suggests that 61% of investments in the first year were made in electronics, but corroborating evidence for this figure cannot be found and other evidence suggests this may be erroneous.

because of the increasing dependence on property and fixed assets, they intend to change the terms of the scheme ... Today, they appear to have turned full circle. Instead of saying that they will limit the dependence of BES companies on property, they are saying that privately rented companies can be 100% dependent on property assets. (HC Deb 9 May 1988, cc. 43)

The introduction of the property element shifted the focus of the scheme, and investment in small firms fell subsequently as £8b was spent on private rented accommodation from 1988-1993 (Simmons 1994 p. 19). In its later years the scheme took advantage of a 'loanback' loophole that allowed investors to exit their BES investments (which they were mandated to hold for five years) after six months, using the loans held against the capital assets of the fund (McConnell 1993 np). This loophole, and increasing opposition to the measure, saw the scheme be wound down in 1993, but only after £650m had been invested in its final year (ibid).

The BES scheme, by its end, had metamorphosed from a scheme designed to support self-employment and small firms to one that was almost exclusively oriented around property investment. It had been successful to an extent in directing capital toward the small firms sector, but its risk-averse nature did not align the supply of capital with the incentives expected by investors, and ultimately it moved far from its original intent and was adapted to meet other policy aims. Further, it had spawned an industry entirely based upon servicing BES, and upon the winding up of the scheme the parts of the sector collapsed under decreasing property prices and the lack of suitability of subsequent schemes (see Cole 1993 p. 30, Macerlean 1994 p. 2)

With the winding-up of the BES scheme, pressure grew on the Major government to introduce a new scheme to supply government backing to small firms. It responded by announcing two new schemes in December 1993, which effectively split the idealised functions of the BES: the Enterprise Investment Scheme was designed to support investors in early stage companies, and the Venture Capital Trust scheme was intended to draw upon the capital markets to provide tax-efficient incentives for investors to back small firms (Wilcock and Thapar 1993 p. 6). This represented an advance in the understanding of the supply of capital:

rather than assuming that markets would naturally fund small firms, it acknowledged segmentation in the demand for capital among small firms.

*5.2.3.2 The Enterprise Investment Scheme and Venture Capital Trust schemes: Refining supply around the market*

The end of the BES scheme facilitated the introduction of two transitional schemes that represented refinements in the policy aims set forth in the BES. The EIS scheme was explicitly designed to support investments by individuals in small firms, whilst circumventing the ability for these investments to be managed by funds (Counsell 1993 p. 12). EIS was intended to boost 'angel' investment with its bureaucracy and numerous other challenges. In his 1993 Budget statement, Chancellor Kenneth Clarke presented the terms of the new scheme: up-front tax relief would be 20%, but any losses would qualify for income tax and capital gains tax relief, with all capital gains being free of capital gains tax. Investors could invest up to £100,000 annually (HC Deb 30 Nov 1993 vol 233 cc937-938). The design of this programme was initially disappointing to the City, and few expressed interest in developing investment vehicles for the scheme, even BES specialist investment trust firms such as Johnson Fry (Counsell 1993 p. 12). Yet this disappointment for consumer investors represented (rather perversely) a boon for firms. The EIS scheme's design meant that the tax benefits were not upfront (20% relief versus 40% in BES), although losses were eligible for relief and CGT was avoided on any capital gains. This made the terms much less favourable for all but the most dedicated investors – those who were willing to accept any losses at all. Recognising this, Clarke acknowledged that limited scope of the scheme's appeal would likely result in a maximum annual cost of £50m (HC Deb 30 Nov 1993 vol 233 cc938).

The scheme itself ultimately did find a limited but eventually expanding audience. Its cost in the first and second years was only £10m and 15m (HC Deb 24 April 1996 vol 276 cc158-9w) However government expenditure on the scheme grew to £278m in 1998-1999 and £662m in 2000-2001 (HC Deb 24 July 2002 vol 389 c1184w). This growth may be attributed to increases in the maximum limits of investment from the initial period, and to a shortening of the length of time investors were required to maintain holdings (Cowling et al 2008 p. 4).

The EIS scheme has been maintained now for over fifteen years, and there has been a small but rigorous pool of literature regarding the success of the scheme. Boyns et al (2003) evaluated the scheme and found that EIS had been successful in attracting investors who would not otherwise have invested in EIS-backed firms (ibid par 4.4.7-8), and the funds attracted enabled firms to make investments and attract external skills they might not have otherwise been possible (ibid par 5.10.1-2). A later examination of the economic impact of EIS suggested that the scheme was associated with increased building of fixed assets and general capacity, although the costs per economic outcome (i.e. each job created) were relatively high (Cowling et al 2008 p. 49).

By incorporating back-end tax benefits and avoiding investments in capital-intensive sectors, EIS refined the core idea of the BSS/BES model into a scheme that achieved its aims whilst still leaving room for innovation and creativity<sup>19</sup>. It serves as a contrast to the Venture Capital Trust programme, EIS's sister scheme, which incorporated more of the BES's consumer-facing aspects, and inherited more of the risks and political debate engendered by the BES.

The intention to create a VCT scheme was announced in the Budget in late 1993, but whereas EIS was announced immediately within the Budget, the VCT scheme was to be based around a consultation process. The consultation document was released in March 1994, and called for tax-free dividends and capital gains for the scheme, while fund managers could only award £1m per year to any firm, and any firm receiving aid could only have £10m in assets (Bethell 1994 np.). The consultation document was criticised by the investment trust sector upon its release, arguing that the administrative costs of running such a fund would be too high, the horizons required to hold investments would be too long, and that it would be "impossible to make money of such small deals" (ibid). At a consultation meeting in June 1994, the lines of conflict were clear: Inland Revenue and the Treasury wanted the scheme to directly focus on the equity gap, which they

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<sup>19</sup> For example, the EIS scheme has been used as an alternative to signing to record labels by up-and-coming bands, who issue shares under EIS entitling shareholders to portions of the rights to band's albums, touring and merchandise (Meeke 2009 p. 10)

identified at £500,000-£1m (Tulloch 1994 np). They held that there were many firms already handling deals of £1-2 million, and that the proposed VCT scheme would not have a significant effect competing against private firms and 3i (which was by then in the process shedding its links to the banks via its IPO). This was countered by the BVCA and Association for Investment Trust Companies (AITC), who argued that the small size of the firms would not attract significant levels of investment with such low returns (The Independent, 1994 p. 26) and that the only way the scheme could succeed would be for the minimum level of investment to be increased to £3m, with a requirement that 20% of investments be for less than £1m (Tulloch 1994 np.).

This discussion represented the conflicting intents of the investment trust sector, which was clearly focused on tax-efficient relief, and government attempts to address the funding gap. It also posed a philosophical question for the Treasury: was it better to have a widely successful programme that only targeted the need peripherally, or a less-successful programme that specifically addressed the perceived equity gap? The presence of a significant number of funds making deals above £1m and the reluctance of investment trusts to make smaller investments typifies some challenges facing policymakers.

Ultimately the chancellor addressed the BVCA and AITC concerns in a different means than expected, by adding benefits for potential consumer investors: 20% up-front tax relief and CGT relief on reinvested funds, whilst maintaining the lower investment limits (HC Deb 29 November 2004 vol 250 c1099). In this speech he took pains to “not describe tax reliefs of this kind to stimulate investment in business and enterprise as tax loopholes, which they are usually identified as by the Opposition” (ibid). Whereas the BES might have been considered a loophole, the VCT scheme, it was claimed, was not intended to operate in the same way.

Response to the scheme was positive, although upon publication of the bill Jonathan Blake, director of the BVCA, commented “We would be very surprised if the sum of £2.5b [the initial target for fundraising announced by the Chancellor] were raised in the first three years. There are probably an insufficient number of

decent investments to make that possible” (Miller 1995 np). The scepticism, as well as a delay in finalisation of the rules, meant that the VCT scheme began with a slow start, only raising £50m among three funds in its first few months, and with only another eight funds being launched in the year following (Fox 1996 np).

The scheme did slowly begin to catch on, with more fund managers launching funds and the sector slowly beginning to accumulate critical mass. The Labour victory in 1997 saw a generally similar level of support for the VCT scheme, with the exception of newly tightened rules on asset-backed investments made by VCTs (The Times 1997, np). The first few years of the VCT scheme had seen several solely asset-backed schemes, including the Downing Protected and Baronsmead families of funds, which used multiple VCTs to pool funds for asset-backed investments including hotels and nursing homes.

This would prove to be the greatest longstanding issue facing the VCT scheme: by opening the scheme to consumers, its designers had consigned the investment profiles of many of the firms to as many low-risk investments as possible. Unlike institutional investors, individuals’ appetite for high-risk ventures is low, especially considering the VCT scheme’s billing as a high-risk scheme solely because it was untested. By naturally incentivising conservative investment patterns, it was filling a gap in capital, but not capital involving higher levels of risk. Chapter 6 contains detailed analysis of the investment patterns of the VCT schemes.

#### *5.2.3.3 Other supply-side schemes 1980-1997*

While the BSS, BES, EIS and VCT schemes were the most high-profile supply-side schemes, there were several other schemes put in place to supply capital to firms. This section briefly discusses them and their effectiveness.

The Wilson Report of 1979, in addition to its call for more equity-based support for firms, argued for the creation of a scheme to guarantee loans, on the ground that commercial competition wasn’t strong enough, and that the public return and jobs creation from small firms was great enough to justify intervention (Wilson

Committee 1979). Almost immediately afterward, a scheme was put in place to address this gap. The Loan Guarantee Scheme (LGS, also known as the Small Firm Loan Guarantee Scheme) used government funds to guarantee loans to firms that did not have the requisite level of assets. The National Audit Office described the LGS as an attempt to bridge the equity gap between banks and firms (Cowling and Clay 1995 p. 142). It is worth noting the identification of the equity gap in this context, which was not in line with other definitions of the equity gap (i.e., involving lack of equity) discussed elsewhere in this chapter. Regardless, the terms of the LGS were repeatedly altered (six times in twelve years) and the scheme had relatively little adoption, despite the benefits offered to firms (ibid p.143, 148).

Another set of programmes introduced in the early 1990s that were relevant to the supply of capital to small firms were the SMART and LINK schemes, which provided grants firms to support R&D, feasibility and market development (Abramovsky et al 2004 p. 12). These schemes have been extensively assessed (see ibid, Malik et al 2006, p.208), with the general consensus being that they provide very beneficial certification for small firms activities (Malik et al p. 212) and provide support for things that might not otherwise be commercialised (ibid p.211). Aspects of this scheme will be discussed later in the chapter.

#### *5.2.3.4 Emergence of demand-side policy interventions: 1979-1997*

The initial phases of the Tory small firm policies were generally oriented toward promoting new firm formation. At the same time there was a sharp increase in firm formation, and although a directly causal link between firm formation in this period and the range of government policies is unclear (see Mason 1989 for a review), the policy environment was conducive for small firms. In the case of BSS and BES, the precise role of the capital that was being directed to firms was rather unclear. If the intent was to direct funds to new firms, then large institutionally-managed funds may not have been ideal options to allocate the funds, although they might have been more suited for more established, growing firms. The distinction between the targeting of these funds became clearer after the establishment of the EIS and VCT schemes. These served to fill the needs for very

early stage capital via EIS, whilst allowing more established firms access to market-mediated funds via VCT.

At the same time, a shift was underway in government attitude toward small firm policy away from new firm formation and toward support for existing firms. In 1990 the new small business minister, Tim Eggar, disavowed the equity gap as a model for government intervention. Instead he argued for a skills-based approach that would see small firms acquiring knowledge and resources through networks and transactions with other firms (Oates 1990, p.72-74). Eggar and his successor, Baroness Denton, began to establish policies to grow existing firms by developing human capital and facilitating firm growth by mixing skills provision with funding (Rock 1992, p. 13). The resulting policies included Training and Enterprise Councils scheme, locally run, government-backed organisations that were designed to be local providers of training and enterprise development (Hill 1990 p. 58-62). This scheme was followed in 1994 by the Business Links scheme, which was intended to provide 'one stop' hubs for access to funding (especially angel investors) and general business support services (Rock 1994, p.30-34). This was unique in considering funding as part of an integrated business support agenda, rather than an issue to be considered on its own.

By the time of the Labour electoral victory in 1997, the Tory model of government intervention in the supply of capital via tax breaks and the development of capabilities within firms was well established. The new Labour government would come to approach both supply and demand issues for small firms in a new light.

#### **5.2.4 The new focus on technology based firms and small firm policy under New Labour, 1997-present**

By the mid-1990s, the success of US high-tech firms was becoming more apparent and interest began to grow in how the UK was helping its small technology-based firms to develop. In 1996 the Bank of England released a report on the topic that marked a gradual shift in the policy dialogue beyond the original Tory distinction between entrepreneurial start-ups (via the EIS scheme) and firms ready for growth (via the VCT scheme). The Bank's report was the first of three released in a six month period in 1996-1997 by the Bank, the CBI, and the Lords Select



Committee on Science and Technology. If the EIS and VCT recognised a distinction between these two types of demand, this trio of reports acknowledged a third type: demand for capital from small technology-based firms.

#### *5.2.4.1 The 1996/7 reports on small firms*

The Bank's report was published in October 1996, and was based on surveys of technology-based firms and consultation with stakeholders from the sector. It examined both supply and demand side elements of small firm finance. In examining suppliers of funding, it praised angels as untapped resources (Bank of England 1996 p. 28-9) but criticised the tendency of the UK venture capital industry to lapse into MBO investment (*ibid*). It found that firms perceived venture capitalists, as well as banks, to not understand technology enough to make a judgment about their businesses (*ibid* p. 42). While welcoming the VCT scheme in principle, it was concerned about a lack of interest in technology among VCTs<sup>20</sup> and the limited time horizon of investments (*ibid* p. 62).

Despite the attention to supply side issues, the report paid particular attention to the development of demand-side policies in addition to supply-side ones. In fact, ten of the seventeen final recommendations involved the development of human capital in some way, with specific emphasis on building human capital and further developing entrepreneurs' networks.

A few months after the Bank's report, the CBI released its contribution to the discussion. At the beginning stages of the research the Bank and the CBI had agreed to focus on the relevant areas of their respective interest, so the Bank had focused on the financial system while the CBI focused on management and training issues, as well as corporate relations (Piper and Lund 1997 p. 210). The resulting report, *Tech Stars*, found that managers of small technology firms typically had the technical but not managerial skills required to grow their funds (CBI 1997 p. 3). The CBI report mirrored the Bank's findings by arguing that firms or sectors identified as having high growth potential should receive particular support from

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<sup>20</sup> Of the twelve VCTs in existence at the time, only two had expressed interest in backing technology firms.

Business Links, and advocated 'Business Boost' programmes that would explicitly aid these firms in raising the funds and attracting the managerial talent they required (ibid p. 4).

Following on from the Bank and CBI reports, the two institutions organised a conference in March 1996 with the Royal Society, seeking to discuss and debate the findings of the resulting papers that had been proposed. The conference, documented in Piper and Lund (1996 p. 211-212), resulted in the adoption of three key points: recognising the importance of angel investors; recognising the inherent challenges associated with convincing institutional investors to commit funds to small firms either directly or via venture capital; and a concern that the VCT programme might be diverted from its original aims to become a vehicle for low-risk investments only.

The CBI report was followed shortly thereafter by the report of the Lords Select Committee on Science Technology. The Committee was welcoming to the Bank's explanation that the lack of suitable seed and growth capital was reflective of a market failure. Given this, much of the committee's conclusions reflected supply-side issues. The final results and recommendations identify some key issues, including the cost of due diligence<sup>21</sup>, the capital gains tax status of entrepreneurs, and include a high level of concern that the VCT scheme was being used for asset-backed investments rather than for riskier ventures (House of Lords 1997 p.14-16).

#### *5.2.4.2 Beyond markets and incentives: Small firms policy under New Labour*

The subsequent general election saw a Labour government enter power for the first time in nearly two decades. The New Labour agenda rejected the previous Labour aims of government institutions to control the economy (which had been

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<sup>21</sup> One fascinating note which was identified by the Lords and seems to have never been significantly followed up was a report received by the Committee that the 'Big Six' accounting firms were acting in concert to "impose standard terms on venture capital firms to limit their liability on venture capital due diligence work. This... could result in fundamental changes in current practice which would restrict the venture capital available to UK companies" (House of Lords 1997 par. 2.25). The committee did not take evidence on the subject and this issue of accounting firms' relationship to the practice of due diligence is an area of significant interest and possible future work.

advanced in the context of this debate as late as the early 1990s), and focused instead on developing a new 'knowledge economy'. The book *Promoting Prosperity*, published by the Commission on Public Policy and British Business (an affiliate of the Labour-associated think tank the Institute for Public Policy Research, served as a vision statement for the future of the British economy. This document identified networks as a key feature to develop in the economy. It suggested networks would allow individual actors to help each other develop, while the government would provide skills and capacity building (IPPR 1997, p. 124-127). The document and others from IPPR in the period (see Gavron 1998 and Blair 1998) adopts the language of the Bank, CBI and Lords reports, whilst adopting and highlighting a rejection of the funding gap framework (whilst acknowledging the challenges facing technology-based firms) in favour of a skills and knowledge-based understanding of business underperformance (Gavron 1998).

Following the Labour victory in 1997, the first new policy directives came in late 1998 with the publication of two key documents, the Williams Report, which evaluated existing Treasury programmes, and the DTI White Paper on Competitiveness, which outlined the New Labour agenda for the economy.

The first main policy document from the Labour government on the topic of small firm finance was the Williams Report, published in November 1998, which primarily focused on the mechanics of Treasury policy. It called for changes in the capital gains tax to incentivise long-term holdings, with CGT burdens falling the longer an investment is held (Williams Report 1998, p. 3-4). It also identified that the risks facing technology-based firms were indeed higher than most other firms, and that therefore incentives would need to be drawn up appropriately. Given this, it proposed the creation of a second tier of VCTs, 'technology VCTs' for which investors would receive 40% tax breaks rather than the normal 20%, in return for more high-risk investments (ibid p.4-5). In addition to these it urged the creation of tax-favourable options for executives of small high-tech firms to be paid with equity in the firm. Despite the generally wide acceptance of these recommendations, few of the recommendations found their way into actual policy.

The White Paper built on the themes of capabilities, collaboration and competition put forward in the IPPR Promoting Prosperity (IPPR 1997a) document. The White Paper very clearly laid out an agenda identifying the 'knowledge economy' as the key area for strategic focus, suggesting that as economies became internationalised and labour costs fell, sustainable competitive advantage would only come from knowledge-based value addition (DTI 1998).

Key to this vision was the role of entrepreneurial firms. As suggested by the IPPR document, the White Paper called for stronger roles for the Business Links network. To meet this, it called for the creation of more firms<sup>22</sup> (specifically referring to the Scottish Secretary of State's plan to create 100,000 new firms in Scotland (DTI 1999 par. 2.18)). It also called for the creation of regional development agencies, which would serve a mediating role between national government and the local authorities, which had previously been in charge of their own economic development. The proposed creation of RDAs mirrored another IPPR report (IPPR 1997b) that proposed an increased role for regions.

However the key contribution of the White Paper to the discussion of small firm finance was the announcement of a £150m Enterprise Fund. This fund would seek to boost British competitiveness and promote entrepreneurship, but rather than addressing the funding gap as a unitary issue, it adopted the principles of the 1996 and 1997 reports by the Bank of England, CBI and Lords by seeking to address sectoral, locational, and other specific aspects deemed as needing investment. The four areas identified in the White Paper for investment were: a national VC fund for early-stage, high tech businesses; regional VC funds that would use local knowledge to boost VC; support for the Small Firms Loan Guarantee Scheme; and additional joint public-private financing initiatives (DTI 1998 par. 2.24). The following subsection will discuss the implementation of the first two schemes, in the form of the Regional Venture Capital Fund scheme and a series of other VC funds oriented on high-tech firms.

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<sup>22</sup> This was an unusual move that was immediately reminiscent of the Thatcher government's policy, but in fact was reflective of Labour's aims of using entrepreneurship as a means of bridging social gaps, as outlined in Joseph 2000.

#### *5.2.4.3 Regional Venture Capital Funds*

One of the key ideas coming from the White Paper was the notion of government-backed regional venture capital funds, but this was not at all, in fact, a new idea. The first clearly defined regional VC funds dated to 1985 (Hamilton 1997, p. 2), although in this way they were often started by the pension funds of individual councils and in some cases large companies. They generally repeated the 3i business model in the regions, employing 3i-trained staff who would then continue to ply their trade once leaving the organisation.

The early 1990s had seen the emergence of several large regional VC operators (Hamilton 1997, p.2). The first large VC fund along these lines was Northern Venture Managers, whose fund, launched in 1989, was enormously successful – after initially seeking £10m, it was massively oversubscribed and closed with a pool of £15.4m, drawing its funds from investors from London, Scotland and the North East and North West (Hobson 1990). NVM's managing director, Michael Denny, remarked at the time<sup>23</sup> that he had had no problems raising funds for the first NVM fund, which made investments between £200,000 and £2m, with an average investment size of £700,000 (ibid). In this period the deal sizes varied enormously, from a few thousand to several million. The Midland Enterprise Fund, jointly backed by the newly-created East Midlands Enterprise RDA and Midland Bank, funded a range from £5,000 to £175,000 (Harris 1992 np.).

Although Government-funded regional schemes had been mooted for a number of years (Woodcock 1991 p. 25) and the European Investment Bank had already begun to invest in some funds (Campbell 1998 p. 10), the White Paper identified this as an area of priority. When the plans were finally announced in January 1999, they called for £35-50m, which would primarily be used to 'prime the pump' by leveraging government funds to demonstrate to investors that early stage capital investments could indeed be profitable. (Campbell 1999 p. 15).

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<sup>23</sup> The NVM fund benefitted from raising funds at the peak of the market in 1989, shortly before the recession of 1990-1992 and the subsequent challenges for VC/PE firms in raising funds.

Following the announcement of the RVCF scheme, several RDAs sought to directly run the new RVCFs in their regions, with maximum investments of up to £5m (Wighton 1999 p. 8). This was strenuously opposed by the private VC sector, including 3i, which made threats to shutter branches of its nationwide network if such terms, particularly the maximum deal value, were to be introduced; it argued for a maximum RVCF investment of £250,000 (ibid).

#### *5.2.4.4 University Challenge Funds and Early Growth Funds*

In addition to the regional aspect of VC provision, the government pressed forward with a series of other new funds that would back VC investment in other specific areas. The principle behind the University Challenge Fund scheme – government funds to back government spinouts – was announced by Gordon Brown in 1998 (Brown 1998, p. 16). Universities, on their own or in consortia, would bid to receive funds to create UCFs dedicated to funding the commercialisation of their technologies (Green 1999 p. 1). The initial £50m pool was expanded to £65m in the Chancellor's speech the following year (Brown 1999 p. 16), and designed to provide early stage VC between £5,000 and £250,000 (Hall 2003 p. 5). The scheme was praised for the creation of many new university spin-out firms, as 175 new spin-outs were created in 2001, and the University of Sheffield and Sheffield Hallam University announced plans to create 90 new spinouts between themselves from 2002-2004 (Gibson 2002 p. 18).

This enthusiasm soon began to appear to be its own boom-bust cycle as the formation of spinouts began to slow amid concerns about the viability of the firms created and backed by the UCFs. The Lambert Report of 2004 expressed significant concern about the viability of spin-outs (Lambert 2004, p. 5). Meanwhile, funders and some university executives were also becoming increasingly sceptical, after the failure of several high profile UCF-backed firms. (Guthrie 2004 p. 1).

Another scheme announced in 2002 was the Early Growth Fund, which was targeted at firms seeking less than £100,000 (Rigby 2003, p. 2). With funding of only £20m, the scale of the fund was modest, with that funding divided for the

creation of other, more regional funds, such as the London Seed Capital fund, which operated with £4.8m (Pickard 2002 p. 2, Blitz 2004, p. 3)

#### *5.2.4.5 'Investment Readiness' and the growth of new demand-side policy*

While efforts to provide funding to small firms continued through the 2000s, the focus in the early 1990s on filling managerial and skills gaps became a greater part of policy, with the Business Links scheme expanded and linked in with the RDAs. The idea of a skills gap, in its initial permutation, referred to a lack of managerial skills. The 2000 pre-Budget statement took the idea forward, identifying a lack of firms that were 'investment ready' and thus able to receive the newly enhanced access to equity investments (HM Treasury 2000, par. 3.63). When the details were specified in later documents (see HMT/SBS 2001), the investment readiness problem was framed in terms of firms not knowing the equity opportunities available to them, not knowing how to make their business plans pleasing to investors, and a general aversion to use of equity for fear of losing control of their business.

This policy framework was criticised by Mason and Harrison (2001 p. 664-665), who argued that the government's framework ignored the issue of investability, specifically whether firms had good business plans and represented good investments to external funders. Mason and Harrison proposed a five-step investment readiness programme to address the problem (p. 666-668). Later they drew on the experience of the LINC Scotland programme, which provided services to assist firms that were having difficulty raising funding by leveraging the knowledge and financial resources of the business angel community (Mason and Harrison 2004).

This has been followed by an increased awareness of demand-side issues for small firms, to the point that the chair of the BVCA in 2006 advocated demand-side approaches to policy rather than a focus on the equity gap (Skypala 2006 p. 4).

### 5.2.5 Toward a risk-reward model: Policy frameworks 2000-2009

Policy developments since the 1998 White Paper have continued to accept the notion of an equity gap. The 2003 *Bridging the Finance Gap* white paper (HMT 2003) provides data that point to finance decreasing as a barrier to growth from 1991-1999 (ibid par 2.3). However it suggests that the equity gap has persisted and possibly grown (see para 2.20), and discusses more recent qualitative evidence (drawn from Henderson 2000) that find that the equity gap (or at least the perception of an equity gap) remains, and that the UK is unique in having the phenomenon (ibid para 2.21-2.24). It also refers to the importance of demand-side measures (as in Mason and Harrison 2001).

The main contribution of the *Bridging the Finance Gap* paper is its recommendation of the adoption of the US SBIC business model as a means to address the funding gap by changing the risk-reward profile of early stage investment. This was implemented in the creation of the Enterprise Capital Funds scheme in 2004. As with SBICs, the ECFs would make investments between £250,000-£2m and be run by private funds. These would need to raise private money, alongside which the government would contribute funds as a less-than-equal partner, much as in the RVCF scheme (Moules 2003 p. 10). Despite the announcement in 2004, Brown waited until after the 2005 election to introduce ECFs (Guthrie 2005 p. 5), touting them as an alternative to government support for MG Rover when that company collapsed (Eaglesham 2005 p. 4). The ECF model, drawing again upon the public-private fund model, represented another step in the further development of the provision of capital to small firms from the state.

This emphasis on manipulating the risk profile of investments has represented the most recent phase of the evolution of the UK government's approach to the institution of the equity gap. By adopting an approach that is driven by the private sector but uses the government to carry parts of the risk, the government is attempting to support the industry and fill the perceived gaps. The following section will shift our attention to the emergence and development of the private VC sector in the UK.



### *5.3 The emergence of the UK venture capital sector: A capabilities-based interpretation*

As discussed in Section 4.3, venture capital as an institution exists only when there is some party willing to provide VCs with funds to invest. In the UK the relationship with institutional investors has historically been, if not strained, certainly more complex than the US. The following subsections will discuss the emergence of the UK VC sector and the relationship between ICFC/3i and the nascent sector, which the section will argue played a crucial role in the evolution of the broader UK VC/PE sector.

#### **5.3.1 Venture capital pre-1979**

While the UK VC sector is generally attributed to have been founded in earnest in the early 1980s, the prevailing view in the late 1970s was that the era of venture capital had come and gone. Meade (1977, p. 663) refers to “venture capital fever” in the early 1970 that had now subsided into long-term decline, and Rowley (1976, p. 19) refers in retrospect to 1965 as the “heyday of the venture capital era”. The venture capital discussed here was in many ways similar to the US model of VC, with different aims (high capital gains) than the then-prevalent ICFC (which sought regular profitable income).

Among the highest profile of the 1960s venture capital firms was European Enterprises Development (EED), which was established in 1964 in Luxembourg as a venture capitalist for the whole of Europe (Meade 1977, p. 668). Funding for EED was provided by American, British, and European banks, and the president was an executive from ARD. As with ARD, EED’s business model was based upon capital gains following on from sales of its investee firms; however the general lack of a liquid secondary market in Europe meant that exit was much more difficult, and when the economic situation in 1976 led banks to limit corporate overdrafts, the firm was rendered dormant (Rowley 1976, p. 19).

Beyond EED, a number of UK-based venture investment firms were established in the mid-1960s, although general indications suggest that returns were typically

quite poor. Spiegelberg (1973) profiles Spey Investments, which was formed to invest institutional funds in small firms. With funding from some of the most high-profile UK pension funds, the fund raised £50m and dispersed it relatively quickly, but a number of investments failed and the group was sent into a tailspin that resulted in the resignation of the founders and the withdrawal of all investors and the failure of the company. Despite this and numerous other cases (see additional discussion in Meade 1976 p. 667-670), the institutional structure was such that the US model clearly did not work. The lack of exit opportunities provided a structural barrier, and by the late 1970s, the rise in interest rates (from 10% in 1970 to 16% in 1976, *ibid*) meant that there was little chance that venture capital investments could match these returns<sup>24</sup>.

These initial funds were largely hampered by difficulties exporting the US business model to the UK, which lacked a liquid, technology-friendly market on which to make easy exit. However, the Conservative victory of 1979 breathed new life into the market, and saw it come back in new forms, in which it thrived.

### **5.3.2 ICFC and the staffing of the UK VC industry**

The previous chapter has shown that the roots of venture capital industries are established via the routines of original, pioneer VC firms. AR&D, Fairchild and other early VC and high tech firms played key roles in the diffusion of VC-related skills through the US. Such a role may similarly be ascribed to ICFC/3i, which came from a different perspective but had a similarly influential effect on the industry. ICFC had from its early history maintained a strictly noninterventionist philosophy with its investments; it was understood that the role of ICFC was to provide funds, not advise managers on how to run their businesses (Coopey and Clark 1995 p. 210). 3i philosophies and skills were shared as staff went through a rigorous training programme, such that 3i became known as the “university of venture capital” in the 1970s that would generate “a new kind of investment banker” (*ibid* p. 175). These skills were based on the rigorous screening procedures for

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<sup>24</sup> For instance, ARD’s highest IRR was 18.5% (and even this was significantly skewed by its investment in DEC), and even a majority of US funds in this general time period did not provide returns above 10%. (New Enterprise Systems 1970, quoted in Meade 1976, p. 667).

identifying the targeted high growth, high profit firms and the management of risks associated with these investments.

As the VC sector began to emerge, facilitated by the new government and the new USM market (Lonsdale 1997 p. 124), 3i entered into the VC market in 1980. However with a large and well-trained workforce, 3i was a prime target for other firms, who would poach salaried 3i staff with offers of increased responsibility and performance-based remuneration (Coopey and Clark p. 175-6). By 1984 loss of personnel was so great that 3i also adopted a performance-based compensation scheme to keep up with its rivals in the VC sector (ibid).

### **5.3.3 Specialisation in the UK VC sector, 1979-present**

The entry of 3i into the VC market came as the sector was going through a period of rapid growth, from £20m in 1979 to over £2b in 1994 (ibid p. 129). In its rush to replicate the success of the US VC sector, many VC outfits launched early stage, technology specialist funds (Murray and Lott 1995 p. 290-1). Despite the move toward US-styled investment, certain 3i-linked attitudes about value addition remained: one 3i investor was quoted on the topic of venture capital: “if you graft a professional manager on to a would-be entrepreneur, the result is likely to be disaster – unless the professional manager has entrepreneurial insights himself, in which case he is much more likely to want to start up in business on his own” (Gleeson 1980 p. 18).

The results of this rush to early stage technology firms were mixed. Some funds, such as the biosciences specialist Abingworth (which was only partially based in the UK, but saw only two of its initial 19 UK investments fail) were very successful (Lonsdale 1997 p. 126). Others, such as Electra Risk Capital (of which only two of its 27 investments *didn't* fail), were less fortunate (ibid p. 128).

With many investments struggling and half of VC-backed firms failing (Fleet 1984 p. 21), the market began to transition to embrace new opportunities in ‘merchant’ VC. The market for management buy-outs (MBOs) expanded rapidly in the early 1980s, taking advantage of several aligning circumstances: changes in the

structures of over-diversified large firms, and plentiful debt capital (Wright et al 1991); as well as the Conservative government's enthusiasm for privatising assets that had previously been held publicly (Wright et al 2000 p. 153-155).

The founding of the British Venture Capital Association marked the increased professionalization of the industry, with the term 'venture capital' being used as a catchall for both 'classic' and 'merchant' VC confounded the issue further, as the BVCA was the representative body for both VC and MBO forms of investment. As a result of this, the average size of UK investments made by BVCA members more than quadrupled from 1984-1994 (BVCA 1984, 1994). At the same time, start-up investments fell from nearly 18% of all investments in 1984 to 3% in 1994, whilst MBO/MBI deals grew from 21% to 67% in the same period (ibid.).

As the MBO sector continued to grow (see Wright et al 2000), the remaining early stage VCs faced a change in priorities, especially in light of the recession. Murray and Lott (1995) discuss results of a 1991 survey suggesting that, even disregarding MBO and late-stage investors, generalist VCs still perceived technology-based firms as higher risk and expected higher internal rates of return from technology-based firms. They also found that a majority of generalist VCs had backgrounds in finance or other industries but not in technology, while almost half of VCs had backgrounds in technology (p. 294). In addition they found that technology-based firms were more hands-on than generalist firms, although recessionary pressures made both more likely to be directly involved in the firms they backed (ibid p. 294-5).

The VC sector came back to the forefront in the late 1990s with the dot-com boom, which despite being largely a US phenomenon also had knock-on effects in the UK (the frenzy was such that one estimate suggested that that £150b had been wiped off the value of non-technology FTSE stocks as they had been abandoned in favour of technology-oriented shares, Waples 2000 p. 3). The boom saw overenthusiastic investment in dot-com firms that subsequently failed. While the Murray and Lott survey took place in the midst of a recession, the survey in Lockett et al (2002) took place at the peak of the VC market in 1999. It found an increasing blurring

between technology and generalist investments (ibid p. 1028) as generalists moved into technology-based ventures, even when generalist VCs didn't have the backgrounds to fully assess the technology (ibid p. 1029).

This move into technology-based ventures proved to be ill-judged as the market for technology-based, and especially dot-com firms began to collapse in early 2000 with high-profile failures of firms such as Boo.com (see Hunt 2000 p. 14). However as the market was showing signs of downturn in May 2000, a survey of VCs showed 60% planned on increasing their investments in internet ventures in the following six months (Griffiths 2000 p. 14). The resulting further collapse in dot-com businesses (Andrews 2000 p. 23) began another shake out period in the sector (Daniel and Skapinker 2001, p. 21).

In recent years the VC sector has seen shifting markets, with the influx of additional private funds (often in the form of VCTs). Data (see DTI SBS 2005, para 4.3) suggest that the VC sector has shifted position, with the majority of private VC funds being specialised, while most partially or wholly government supported funds were generalist. With increasing returns from the private equity sector, 3i finally dropped its poorly-performing VC business (Arnold 2009 p. 15).

#### **5.3.4 Funding VC: Pressures on institutional investment**

Pension funds dominate the UK's institutional investment landscape, with a significant concentration of UK workers' savings. (It also makes the emergence of EIS also important, as it provides tax relief to explicitly support individual capitalism.) Pension funds make up a bigger share of investors in the broader UK VC sector<sup>25</sup> than any other form of institutional investors, including banks and insurance companies (Mayer et al 2005 p. 591). However, despite making up such a large share of the market, Clare et al (2009 p. 11-13) find that UK pension fund managers are largely unable to time the market and are unable to provide the value enhancement (in terms of timing the market, for instance) that they claim to offer.

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<sup>25</sup> Mayer et al (2005) base their data on BVCA reports, which reflect not just VC but MBO and other equity based deals as well. Henceforth any discussion of the 'broader UK VC sector' will reflect this same extended definition.

Beyond this, the market has several other distortions as well: whereas in the early 1990s no fund manager in the US had a greater share of the pension market than 3.8% (Lakonishok et al 1991), in the UK five pension fund managers controlled 80% of the UK pension market in 1998 (Lambert 1998, p. 44-45). Beyond this, UK pension funds judge their performance not on absolute terms but relative to their peers, creating significant herding effects as firms try to maintain customers and gain new ones rather than increase fees (Blake et al 1998 p. 459-460). One effect of this herding meant that when UK pension fund managers were not investing in VC, it was ignored by much of the sector. Consequently, North American pension funds, seeking to diversify their portfolios, came to the UK and invested in UK VC funds, making up 47% of the funds raised by UK VCs from 1997-2001 (Mason and Harrison 2002 p. 435).

The difficulties for venture capitalists in raising funds from institutional investors was highlighted in the Myners Report of 2001, which examined the entirety of the UK institutional investment sector. It identified several factors that were undermining UK investors from backing VC. It found that insurance funds were constrained by admissibility rules as to which classes of investments can be counted in the solvency margins. VC and other unsecured investments were limited to 10% of investments, as opposed to the 20% seen in the US (Myners 2001 par 9.24-9.26). It found that the test that assets be 'readily realisable' – able to be sold within seven working days for not less than 97.5% of their market value – also discriminated against venture capital, although the FSA later agreed to consider concessions (par 9.29-9.32). Myners pointed out that the US pension fund sector invested more in the UK VC/PE sector than UK pension funds and outlined a series of measures to boost investor confidence and investment in the sector. Blake (2003) discusses the shift engendered by the Myners report whereby liabilities became increasingly important as means of classifying and grading assets and potential investments. This was meant to be a positive result for the UK venture capital sector, although subsequent data (see BVCA 2006) would suggest this may not have necessarily been the case.

One policy outcome of the Myners Report was the creation of a High Tech Fund of Funds, a public-private fund that would stimulate institutional investment in the UK VC sector and lead to continued institutional investment in the sector (Clarysse et al 2009 p. 21-22). The government contributed £20m with an additional £106m raised from institutional investors. Despite the size and profile of the fund, relatively little is known about it and its success, and it remains an appealing topic for further study.

This section has shown how the institutional investment sector, and particularly pensions, are extremely concentrated in the UK and how the rise of the MBO has led both to confusion as well as to the abandonment of VC-style investing in favour of PE. Such behaviour has produced better returns, and the 'herd mentality' of the UK pension fund managers has not incentivised significant investment in the sector. Indeed, by the late 1990s US pension funds were playing as significant a role in backing the UK VC sector as the domestic institutional investor sector. In light of this, the sector has fragmented in several ways, with different actors seeking to fill different parts of the market. One key reason behind the widespread lack of very strong returns in the UK has been the challenge of finding good exit opportunities. The following chapter will discuss this challenge in historical terms.

#### *5.4 Opportunities for exit for UK VC investments*

The success of a venture capitalist, particularly in the eyes of an institutional investor, will be dictated by his or her ability to bring firms to exit successfully. Although there are several forms of exit (see Cumming 2003 for a typology), the IPO is traditionally perceived to be both the most profitable and the most high-profile means of exit. The ability to bring firms to IPO, as argued in Chapter 4, has been developed in the US as a dynamic capability that requires the assembly of various complementary assets. At the same time it requires the presence of an equity market with an appetite for IPOs. The UK has tried to develop domestic secondary markets for VC, but as this section will show, there have been significant political considerations to the design of these markets, especially for the prevailing AIM market.

#### **5.4.1 IPOs and firm exit pre-1979**

The first attempts to create a UK VC sector in the late 1960s and early 1970s were seriously hindered by the inability of VCs to exit their investments (Meade 1977 p. 767). This was largely due to the structure of the London Stock Exchange; the consolidation of the regional stock markets into the LSE in 1974 had particular impact on small firms as it closed off immediate access to capital (Michie 1999 p. 501-502). The LSE board acknowledged the flaws of its handling of small firms in 1974 (ibid p. 531), and announced plans in 1978 for the creation of a new market specifically directed toward small firms (ibid p. 571).

#### **5.4.2 The Unlisted Securities Market (USM)**

Plans to introduce a new Unlisted Securities Market moved forward with a new Conservative government rising to power. The LSE (in its unitary role as market and regulator) was especially fearful of encouraging speculation on young ventures (Michie 1999 p. 571-572). At the same time, ICFC/FFI/3i-backed investments were beginning to present a market for a small cap market (Coopey and Clark 1995 p. 199, 275). The plans for the new USM called for it to be open to any firm that had been in existence for three years, with five years' financial statements required if the firm had been in business that long (Hutchinson et al 1988 p. 11). With no underwriters involved, costs were lowered.

In its initial years, the USM was quite successful, driven in early years by MBOs from the burgeoning VC/PE sector (Wright et al 2000 p. 150). Approximately 200 firms were listed on the market, with an average market value at flotation of approximately £10m, compared to the average value of firms floated on the LSE, which was £38m (Hutchinson et al 1988 p. 12). In 1985, its peak year, 89 firms listed on the market, raising £300m (Independent 1991, p. 25). Indeed, in terms of identifying high-growth small firms, the USM was widely found to be successful, with the firms listed on USM having higher growth rates and gearing and lower liquidity than peers at the same time (Hutchinson et al 1988 p. 17). More immediately, the USM beat the FT All-Share index in terms of performance by 19.5% in 1987 (Speck 1989, p. 1).



However this trend began to decline with the weakening economy of the late 1980s. As the takeover market expanded, more MBOs started to list on the Main Market instead of the USM (Wright et al 2000 p. 150). The USM's performance against the All-Share index fell from -3.5% in 1988 to -15% in 1989. This economic downturn facilitated a decline in USM admissions in the early 1990s, going for a period of nearly a year in 1990-1991 with no listings (Independent 1991, p. 25) and with only four listings from 1994-1995, raising a total of £1.4m. (Hellier 1995, p. 21). Linking with this was the fact that due to changes in EU regulations the listing requirements for USM and the LSE were by this point relatively similar, and firms seeking to go public were choosing to go 'all the way' and offer shares on the main board (The Economist 1993, p. 82).

The USM showed that a secondary market to the LSE could work, and the recession of the early 1990s cleared the way for a new market to be created (and for complementary policy opportunities with the dropping of BES in favour of the EIS and VCT schemes). The following section will discuss the very different conceptions for what ultimately became AIM.

#### **5.4.3 AIM and the politics of market creation**

The announcement of the closure of the USM was widely criticised, as the initial intent seemed for the market to not be replaced (Thapar 1993 p. 27). The LSE climbed down from this position in 1993, appointing a working group to examine the issues of a secondary market. With membership composed of the representatives of the VC and stock market communities, the committee was divided between two opposing visions of the market need (Kay 1994, p. 2). The stock market-oriented perspective, which had the backing of the government, envisioned the new market as a mini-LSE that would replicate the USM's function as a generalist market at smaller valuations (Thapar 1994a p. 1).

This interpretation of the need for a direct descendent of USM was challenged by some in the VC sector, who sought to create a new, technology-focused market that would be modelled on NASDAQ. The listing of British Bio-technology on the LSE in

1993 only proceeded once the LSE waived rules requiring firm profitability, and this, along with defections of UK firms to NASDAQ led to calls for a pan-EU technology-focused market (The Economist, 1993b p. 74). The defection of UK technology firms to the NASDAQ market was increasing, and there were concerns that the UK would begin to lose out (Baker 1996 p. 7)

The consultation document was published in September 1993, albeit without strong backing of the rest of the group. It called for a new market, called the Enterprise Market, which would be a part of the LSE but have a separate management structure (Thapar 1993 p. 27). It would loosen restrictions on firms that could list, even allowing firms with minimal trading history to list (ibid).

The plan was considered at the LSE board's meeting in December 1993, but the board chose not to implement the plan, instead opting to carry out additional market research (Hamilton 1993 p.2). This was roundly criticised and seen as a stalling technique (Thapar 1994b p. 20), and in January 1994 Ronald Cohen, chairman of VC group Apax Partners, criticised the LSE decision not to publish the committee's report. Cohen announced an intention to create an alternative to the LSE's plans, one that would be based upon "entrepreneurially managed growth companies" (Kay 1994, p. 2) that would seek to replicate NASDAQ.

After further perceived stalling from the LSE (Thapar 1994 p.1), it announced its plans for the new market: there would be none (Waples 1994 p. 4). Instead it presented a seven-point plan to eliminate the need for an exchange, turning the existing lightly-regulated 535.2 market into a more established share trading facility with less disclosure required than for USM (ibid). The response was very negative, with CISCO, the City small firms interest group, protesting loudly and advocating the ongoing discussions about creating a pan-European exchange (Kay 1994 p. 2).

This resulted in the drafting of yet another consultative proposal in September 1994. This proposed the creation of a new market to be called AIM – the Alternative Investment Market. As an evolution of the existing 4.2 market, it

provided a market setting but also a lighter touch of regulation (Hamilton 1994 p. 1). Firms would be required to disclose dealings in its own stock (as well as similar matters) but would not require a broker or advisor, and would have limited suitability requirements to listing (Goodway 1994 p. 3). The figures in the prospectus would therefore be the responsibility of the firm's directors. If there was fraudulent activity at work, it was assumed that the financial media, and not immediate advisors, would detect and report it.

The response to the paper was mixed. Some in the City praised it as a great leap forward, while others were critical of the lack of a role for brokers and advisors (Kay 1994b, p.3). The initial paper was followed up in February 1995 by another consultation document. This revised document maintained the lack of specific suitability or trading requirements, but did call for firms to have a nominated broker and advisor (which could be the same firm), who would oversee the due diligence required (Whitebloom 1995 p. 15). Yet the list of acceptable advisors, once published, did not immediately stir widespread confidence as many prominent brokers and advisors chose not to participate. Indeed, some brokers offered all-inclusive listing on AIM for £50,000, leading to some widespread fears that due diligence would be heavily lacking in the new market (Stevenson 1995, p. 27).

AIM began an aggressive marketing campaign, which saw its representatives carry out 29 road shows across Britain, attended by 1900 people, and had received 700 inquiries about listing (Goodway 1995 p. 5). Despite this, fears intensified as the opening date of the market approached, as only eleven firms were registered to be a part of the market from its first day (Hellier 1995, p 21). This nervous start (compounded by fears that the market would be open to fraud) was soon overcome by a fairly rapid growth: within four weeks the market had grown to eighteen firms, with 41 approved advisors and capitalisation of the market growing from £82m to £183m (Pangalos 1995b). While this growth was not immediately replicated, the market did continue to grow, albeit without the support of large institutional investors. These investors were waiting for the market to get to a size whereupon liquidity would be generated, while the market

was waiting for more investors to buy in to its potential. At the same time, advisors were concerned that high tech firms were seeking AIM listing based on hopelessly high expectations for the valuations their firms would receive. This, combined with the risk profile for the market itself and the concerns about fraud, led some advisors to avoid high tech sectors altogether (Stevenson 1995b p. 14).

#### **5.4.4 AIM IPO size and performance**

Ultimately these initial fears proved to be unfounded, as institutional investors' attitudes changed and more firms flocked onto the market, with the number reaching 100 in October 1995. The number continued to rise, boosted in part by the introduction of the VCT scheme. AIM has since become a widely flourishing market, with over 3000 admissions raising £62.6b as of July 2009.

Despite AIM's enormous success, concerns have been raised that AIM does not meet the capital needs of the broader UK VC sector. There remains a contingent (the same that argued against the creation of AIM in its current form) that argues that Europe needs its own technology specialist market. From this perspective (see Abbanat 2004 and Clarysse et al 2009 par 3.1.1), AIM lacks the technology specialisation seen in NASDAQ and as such does not offer the favourable valuation, liquidity, and overall enhanced exit opportunities found by NASDAQ.

The data and literature surrounding the success of AIM demonstrates some of the unusual characteristics of the market. As a market, it is dominated by a few sectors: twenty-three of the top fifty firms in July 2009 are in mining, oil and gas, or other natural resource-oriented sectors. In the same period technology firms (defined here as software, hardware, and biotech) made up roughly 9% of market capitalisation, significantly lower than that found in NASDAQ.

Beyond this, AIM has been identified as the first market where operational performance of firms increases, rather than decreases, after IPO (Khurshed et al 2005). In other words, listing on AIM does not adversely affect firms' performance, but firms continue to grow after listing. AIM firms use the market as a means for

growth<sup>26</sup> and not purely as an end point, after which performance decreases (as is the case on the LSE Official List and virtually all other markets). This is positive for firms that use AIM to access capital, but suggests that AIM is less likely to overprice shares, which would enable VCs to generate high returns such as those seen in NASDAQ. Given that the literature (see Chahine et al 2007 p. 525-526) suggests AIM investments are not as underpriced as other European shares, one must wonder whether these valuations are inaccurate or perhaps reflecting institutional differences in the markets for risk, in line with Bush's (2005) argument about markets for risk in the US and UK as discussed in the previous chapter.

#### **5.4.5 Exits and returns to VC**

As suggested elsewhere in this chapter, the availability of exit opportunities for investments in the UK has been relatively limited, although there is relatively little direct data on the subject. In a survey of VCs, Murray (1994) found that trade sales were generally the preferred means of exit for investments, followed by management buy backs, IPO and sale to developmental capitalist (p.70). He suggested that beyond the initial equity gap there was a 'second' gap at an expansion stage, and that the drive toward trade sales might be due to this second gap (ibid p. 73).

If firms do not seek the large-scale IPO exits, it is somewhat unsurprising that that performance of early-stage investments is lower than that of other schemes. Given the expected balance that a handful of high-value exits will provide very high returns, covering and exceeding other losses, it would appear that a move toward trade sales would take the edge off these investments. Burgel (2000) suggests that the IRRs for early stage and technology based firms are well below those that would be expected by industry (see the high IRR expectations of VCs in Murray and Lott 1995 and Lockett et al 2002). Data in Bank of England (2001) further shows that the performance of funds has been generally lower than MBO deals (and as size of MBO deals increase, so does the difference) (para 3.5-3.11).

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<sup>26</sup> This has been taken to extreme levels by some biotechnology firms that have gone without significant VC funding for their first three years and then listed on AIM with very small IPOs, effectively cutting VCs out of the process (Critical I 2006 p.4)

Despite this, there has been a general lack of quality exit data on VC investments. This will be addressed in the Chapter 6, which will discuss exit patterns in government backed schemes, including VCT and the post-1998 schemes.

## *5.5 Supply-demand relationships, exits and capabilities in the UK VC sector*

This chapter has sought to explore in some degree of detail the dynamics affecting the development of the UK venture capital sector. It has argued that the main relationships that define what we know as VC have each been dysfunctional, with the aggregate result being that few of the conditions to truly replicate the success of the US have been present in the UK. This section will further discuss these arguments and will link them to the previous chapter's discussion of capabilities in the VC sector.

### **5.5.1 Supply-demand relationships, policy and risk capital**

The relationship between VCs and firms has been characterised extensively by the notion of the 'equity gap', the idea that there is a gap in funds available to small firms. From the identification of the Macmillan Gap in 1931, the government has played an active role in the area of small firm finance, and the emergence of the UK's VC sector. Indeed, the 'equity gap' has played a dominant, almost monolithic role in the policy discussions surrounding the UK VC sector. This role is amenable to the interpretation of the notion of the boundary object, as discussed in Section 3.2.3. A boundary object (see Star and Griesemer 1989) is a concept that is universally acknowledged and is broadly actionable, but is actually interpreted to mean different things to different actors. For instance in the case of the equity gap the initial discussion in the Macmillan report reflected, implicitly if not explicitly, Keynes's views on uncertainty. From this perspective the uncertainty surrounding small firms was so significant that intervention was required to bridge that gap. This view was generally accepted throughout the next fifty years, until the Conservative government of 1979. From the Thatcherite view (and the views of subsequent governments), the equity gap was less indicative of market uncertainty, and instead more similar to a market failure. Consequently, it was

perceived, the best way to address that failure was by incentivising investment in small firms, so as to make the market work more efficiently.

This has resulted in a contiguous understanding of the equity gap as a key policy issue, but the framing and explanation of the problem, and the means by which to address it, have changed over time. The initial approach sought to address the gap by filling it with a quasi-governmental institution, ICFC, reflecting broader Keynesian concerns and attitudes of the time. The move toward a market-failure oriented understanding of the issues was reflected in a view that the best way to address that failure was by incentivising investment in small firms, so as to make the market work more efficiently. However, these schemes, such as the BES, were generally recognised to be rather less successful in addressing these funding gaps. The later VCT scheme sought to close the loopholes, but was again widely criticised for underwriting investments that did not reflect the nature of the equity gap.

More recent policies have begun to demonstrate nuance in examining issues surrounding small firm finance. Rather than assuming that directing funds into a general area (such as small firms) will address the problem, they have begun to address specific areas for funding. However even still these policies generally reflect an issue underlying the entire equity gap rationale, in that it assumes that the challenges small firms face in obtaining funding are due to the supply of capital. Such a supply-side approach ignores the prospect that the flow may not be in the supply of capital, but instead in the demand for capital. Despite some measures aimed at increasing demand and encouraging firm survival (including schemes in the early 1990s such as Business Links, and the early 2000s investment readiness platform, see Mason and Harrison 2001), much of the policy effort in the UK has focused on addressing provision of capital, rather than ensuring that there are sufficient firms to receive and successfully use this capital.

At the same time, the government has generally had little interaction with the private VC sector, and some of the most successful firms have had little interaction with government policies designed to boost the supply of capital. This arguably

creates a 'tiered' system in which the best investments get picked up by top firms, whilst government-backed funds support firms that are of inferior quality but do have some growth potential<sup>27</sup>. This itself creates even more distortions in the market, as supply of private capital, supply of public capital and demand for funds all intermingle.

The relationship between VCs and the limited partners who fund them has been similarly strained. The UK's institutional investors are dominated by a small number of fund managers who assess their performance not in real terms but against each other, creating significant herd-mentality problems in that when one avoids VC, the others do as well. In this way the VC sector struggles because of its poor returns in comparison to private equity deals, as well as the proximity of the VC sector to PE (in that VC and PE are often considered to be the same industry). As a result, the sector is squeezed in terms of available cash, again into haves and have-nots.

One reason for this squeeze is the absence of an effective means of exit from VC investments, and this relationship, between firms and markets, is also strained. The AIM market was founded with the intent of providing a second-tier market that would benefit smaller, riskier firms, and it has thrived, although at an unusual price. It has become one of the few, if not the only secondary market to thrive in economic downturns and to be a market that truly facilitates growth as a means to growth rather than an endpoint, which damages the prospects for exit for VCs, and consequently leads to the trade sale becoming the dominant form of exit in the sector.

These distortions have impacted the development of the VC sector, but as yet this section has not discussed the activities of UK VCs themselves. The following subsection will discuss the capabilities that these circumstances have engendered.

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<sup>27</sup> This is the explanation of the funding gap historically used by Ray Oakey: that the funding gap is not about the top 10% of firms, but is instead about the 20% of good-but-not-great firms below the 10% that would be funded anyway. (Personal communication).



### **5.5.2 A capabilities-based perspective on the history of the equity gap and the UK VC sector**

Considering the discussion in the previous chapter of the role of capabilities within that framework, it may be useful to apply a similar capabilities-based framework to explain the history of the UK VC chapter. Here we again adopt a realist and skills-based perspective in explaining the development of the sector in the UK.

The roots of venture capital industries seem to be established via the routines in original, pioneer VC firms. AR&D, Fairchild and other initial VC firms played key roles in the diffusion of VC-related skills through the US. Such a role may similarly be ascribed to ICFC/3i, which came from a different perspective but had a similarly influential effect on the industry. 3i's explicitly non-interventionist screening policy viewed the investor purely as a distributor of funds, with no place for editorialising about the management of the fund (Coopey and Clark 1995 p. 210). When the VC sector emerged, 3i employees, being well-trained at the 'university of venture capital', distributed their skills throughout the sector (ibid p. 175-6).

These capabilities and routines were focused on screening and management of risk (ibid p. 210). The new VC sector, stocked with ICFC alumni, sought to apply these capabilities in technology-specialised funds, but found their (financial and accounting-based) skills did not directly match the skills required to deal with risky technology-oriented firms. As a result some new VC funds succeeded, while others were less successful (Lonsdale 1997 p. 122). In this period two other opportunities emerged that were more suited to the ICFC-based style of investment. The emerging markets for MBOs were less risky than early stage VC and the need for screening and risk management in the market for managers (Wright et al 2000) were more suited to the ICFC style of investment. Further, the introduction of the Business Expansion Scheme provided another means of market entry, which was focused more on conservative investment and compliance with tax rules. Given consumers' aversion to risk, BES firms were more likely to avoid the risks associated with high-tech investment and again play to the ICFC strengths.

This resulted in a fragmentation of the sector, with the MBOs splitting into their own de facto sector whilst the VC sector persevered, albeit with its own divisions. Generalists in the sector typically maintained screening approaches, whilst specialists built up knowledge around particular sectors and added value associated with their technical knowledge (Murray and Lott 1995 p. 290). The government scheme-oriented part of the VC sector continued with BES and then on with the VCT scheme. The dot-com boom saw large numbers of generalists investing into technology based sectors (Lockett et al 2002), and taking significant losses as their technology gambles didn't pay (Lonsdale 1997 p. 122).

The resulting situation is one where a limited number of high-quality, specialist VC firms make value-added investments. They do this on a broad geographical scale and retain their top staff using carried interest; in the words of one VC: "when someone joins our firm, we congratulate them on taking the last job of their life" (Stephen Bunting, personal communication). The generalist market for VC has decreased as the targeted hybrid institutional investment market has grown (DTI SBS 2005 para 3.09-3.14).

This interpretation, in which the 'middle' of the VC market falls away as specialists and hybrid funds emerge, would suggest that the lack of exit opportunities represents a significant problem facing the sector, matching Murray's suggestion of multiple gaps (1994).

## 5.6 *Conclusion*

This chapter has made several arguments about the emergence of the UK market for risk capital. It has discussed the emergence and evolution of the 'equity gap', arguing that the notion of an equity gap has become a boundary object that is widely acknowledged but means different things to different actors. The 'Macmillan' gap was initially understood as a structural flaw in the economy, which led to the creation of ICFC as a national institution to address the gap. The Conservative governments attempted to use market forces to address the gap by

incentivising consumer investment into these areas, but this approach was exploited in unintended ways because of tax incentives. The Labour government has since embraced a more targeted approach to the issue by inducing institutional investors to back the sector, first attempting to demonstrate that investments in the equity gap could be profitable. When this approach was unsuccessful following the collapse of the dot-com market a new policy view emerged that focused on shifting institutional investors' risk-reward profile by creating more hybrid public-private funds to fill these gaps.

The chapter then discusses the emergence of the private UK VC sector and the means for exit, suggesting that both have been strongly impacted, either directly or indirectly by policies present and past. In particular it calls attention to the issue of firm exit; existing evidence suggests that the struggles of the sector to raise funds and grow have been in large part due to poor returns to early stage investments. These returns may be linked to the lack of exit opportunities, which combine with funding pressures to limit VCs to seeking trade sale exits (Murray 2001).

The chapter then presents a capabilities-based interpretation of the case of the UK, suggesting that the training and routines established in ICFC/3i were spread through the VC sector in the early 80s. These screening and investment management capabilities were better suited to the MBO market, leading to the growth of that sector and the decrease of the VC sector. 'Classic' US-style VC played a much smaller role, with fewer capabilities and economies of scale, and diminished means of exit. The result was that those firms with specialised knowledge and capabilities became successful in the VC sector, while others (typically generalists) left the sector.

This chapter has provided an alternate interpretation for understanding the relationship between policy and the emergence of the UK VC sector. However while this chapter has drawn its conclusions from historical and qualitative analysis, the following chapter will present detailed quantitative analysis of the Venture Capital Trust scheme and several other key government equity schemes. The conclusions drawn from this analysis will provide support for the

interpretation of the UK case presented here, and provide the basis for the synthesis and answering of the research question in Chapter 7.

## **Chapter 6: An Evaluation of the Effectiveness of Government-Backed Interventions for SME Finance**

### *6.1 Introduction*

The previous chapter provided a detailed examination of the role of policy in the development in the UK venture capital sector. Drawing upon historical and qualitative evidence it provided an argument that the equity gap framework served as a ‘boundary object’ that mischaracterised both supply and demand for capital. It also argued that the development of the private UK VC sector was hampered by the absence of effective means of exit from VC investments, and finally proposed a capabilities-based interpretation of the emergence of VC in the UK.

This chapter seeks to provide an in-depth quantitative exploration of several themes identified in the previous chapter. It does so by drawing upon data from the Venture Capital Trust (VCT) scheme, as well as several policy initiatives stemming from the 1998 White Paper on Competitiveness. These cases, while not representative of the UK VC sector as a whole, are ‘crucial’ cases, analysis of which will provide a unique perspective of the relationship of policy to small firm finance in the UK. Analysis of these cases will then provide insights that could not be generated by standard analysis of private VC alone.

This chapter seeks to provide empirical support for these initial conclusions, using new and proprietary datasets that cover data on government interventions targeted at small and growing firms from 1995 to 2008. These datasets include data on unique investment-level data for the venture capital trust (VCT) programme, followed by investment-level data examining investments made by several schemes stemming from the

Section 6.2 will discuss these schemes and their selection and review the current empirical literature on the topic. Section 6.3 will discuss the framing of the research questions for the chapter, and the methodological issues. The quantitative

analysis adopts Cumming's (2007) methodology for examining the relative effectiveness of government schemes in directing funds to small firms. Section 6.4 will discuss the collection of the data and provide general descriptive data examining the VCT and post-1998 datasets. Sections 6.5-6.8 will each discuss analysis and results of research questions set forth in section 6.3, and Section 6.9 will summarise and conclude.

## *6.2 VCTs and post-1998 schemes: Selection, characteristics and relevant empirical literature*

The quantitative analysis in this thesis focuses on one flagship equity scheme, the Venture Capital Trust (VCT) scheme, and a series of smaller government-backed programmes created in the wake of the 1998 Competitiveness White Paper. The decision to focus on the VCT and post-1998 schemes reflects the important and active public role in the sector identified in the previous chapter. The supposed existence of an equity gap has been the driver of public policy toward small firm finance, which Chapter 5 argued has had path-dependent consequences for the later evolution of the sector. Consequently given the considerable impact of public policy in this area, analysis of these schemes over an extended period serves as a rational extension of these arguments. In this way we may view the VCT and post-1998 schemes described below as 'crucial' cases. While they are not necessarily representative of the entire universe of UK venture capital, they have unique and compelling characteristics that give them particular explanatory power, especially in the context of the cases above. This section discusses these schemes and their relevance to the broader issues tackled in the thesis. Section 6.2.1 describes the VCT scheme, Section 6.2.2 describes the post-1998 schemes, and Section 6.2.3 provides a brief review of empirical literature surrounding these schemes.

### **6.2.1 The design and characteristics of the Venture Capital Trust scheme**

The analysis of the VCT scheme in following sections will in many ways reflect particular characteristics of the scheme's design. This section therefore describes the structure of the scheme and how its design has changed over time.

The VCT programme is based around tax relief for individuals. The scheme has changed considerably over time; these changes are summarised in figure 6.2.1. Consumer investors are able to invest in a VCT, with considerable tax benefits. Consumers typically have been able to claim back 20-40% of their investment in VCTs against their tax burden. In addition any income from VCTs is not taxed, and at points in the scheme's history investors have been granted relief from capital gains. Consumers invest in VCTs, which are organised as individual companies with their own boards and governance structures. While VCTs are typically launched and managed by a given fund manager, a VCT is an independent entity that contracts the services of the fund manager and is entitled to replace the fund manager if desired. Fund managers typically charge a premium of 5% of the initial investment, and 2.5% additionally each year (Prosser 1997 p. 18). As part of their tax status, VCTs must be listed on the London Stock Exchange, though the market for shares in VCTs is illiquid as tax benefits are not passed from buyer to seller (Taylor 1997 p. 5).

VCT fund managers are statutorily proscribed in the investments they may make. Of the complete holdings, 70% of the fund must be invested in 'qualifying investments', while the remaining 30% is typically invested in protected or low-risk assets such as bonds. (This means that for an investor, the 20% tax refund is coupled a 30% in protected investments, meaning that half the investment is shielded from risk.) There are several key restrictions on investment. The first is by sector; following the shift of the Business Expansion Scheme to asset-backed investments (such as agriculture, hotels and nursing homes), such investments were eventually banned from the VCT scheme as well. There are also restrictions on firm size and level of investment. Firms were initially not allowed to have gross assets of more than £10 million, though this was later increased to £15 million, then decreased to £7 million, then limited to firms with fewer than fifty employees. VCTs were allowed to invest a maximum of £1 million total in any given firm.

**Figure 6.2.1 – Changes in the VCT scheme, 1995-2009**

<b>Year</b>	<b>Change</b>
<b>1995</b>	<b>VCTs introduced:</b> <b>Investors:</b> 20% tax relief for investors, income and CGT exempt plus CGT deferral; may invest up to £100,000; must hold investments for five years for tax relief. <b>Funds:</b> VCTs must invest 70% in qualifying investments; qualifying investments exclude industries with state-support rules; <b>Firms:</b> Firms must have maximum assets of £10m
<b>1997</b>	<b>Funds:</b> Bank-backed and asset-backed investments (i.e. agriculture, financial services) banned. (Prosser 1997 p. 17)
<b>1998</b>	<b>Firms:</b> Firms may have maximum assets of £15m (FT 1998 p. 6)
<b>1999</b>	<b>Funds:</b> VCT tax relief extended for when VCT-backed firms go public or swap/split stocks. (Wighton 1999 p. 10)
<b>2000</b>	<b>Investors:</b> must hold investments for three years for tax relief (Budden 2000 p. 8)
<b>2004</b>	<b>Investors:</b> Tax relief increased to 40%; CGT deferral ended; maximum investment raised to £200,000 (Ross 2004 p. 1)
<b>2006</b>	<b>Investors:</b> Tax relief cut to 30%; holding period extended from three to five years; <b>Firms:</b> Eligibility to receive investment cut – maximum assets now £7m (Batchelor 2006 p.8)
<b>2007</b>	<b>Firms:</b> In addition to assets, maximum 50 employees prior to investment; firms may raise no more than £2m combined from VCT and EIS
<b>2008</b>	<b>Funds:</b> VAT no longer charged on management fees. (Lodge 2008 p. 15)

These restrictions necessarily changed the behaviour of the fund managers. After initial attempts to invest in very conservative asset-backed schemes were circumvented by rules changes, some VCTs followed strategies of qualifying yet very conservative investments, while more followed approaches of generalist investing. Given the relatively low ceiling of investment size, many funds attempted to generate economies of scale by operating more than one fund, sharing management teams and joining with other managed VCTs to make larger investments. For instance, one fund manager operates four funds, and frequently makes £4m investments in firms, using £1m from each fund under its control.



Consequently it is necessary to clarify the explanatory power of analysis derived from the VCT scheme in relation to the conventional UK private VC sector. Both tend to operate across a range of investment types (including both 'classic' and 'merchant' VC-style investments), and both are run privately by fund management professionals. Indeed, in some cases VCTs are run by the same fund managers who also operate conventional VC funds. However the tax efficient characteristics, consumer investors and restrictions on investment seen in the VCT scheme are quite different from the growth focus and institutional investors in private VC. Consequently, it is important to interpret findings regarding VCTs as having common elements with VC but not being purely representative of the VC sector. VCTs are equity investments made by professional specialists in small cap firms, and the dataset discussed in section 6.4 gives potential for unique insights, but the analysis of the VCT sector should not be confused with a comprehensive analysis of the broader UK VC sector.

### **6.2.2 The design and characteristics of the post-1998 schemes**

In addition to the VCT scheme, this chapter also analyses the raft of equity schemes introduced after the 1998 Competitiveness White Paper. While the political context of these schemes was discussed in Chapter 5, it remains particularly relevant to also consider the more specific details of the schemes that will be analysed subsequently.

The Regional Venture Capital Fund (RVCF) scheme was developed as part of the response to the 1998 White Paper. Its aim was to spur innovation and economic growth in the English regions. Tenders were opened for private fund managers to run RVCFs in each of the nine regions, in consultation with the local Regional Development Agency. Successful bidders then launched a closed-end ten-year fund under a limited partnership agreement. Of the nine funds, four were awarded to the same fund manager, YFM (DTI 2006b). The maximum investment size was £250,000, with the potential for a follow-on investment of £250,000. Restrictions on size and sector were also used, as in the VCT scheme (though for RVCF the ceiling on firm size was higher).

The Early Growth Fund (EGF), introduced at the same time as the RVCF scheme, sought to provide capital to smaller firms to facilitate growth. Similarly privately managed, EGFs included both regional specialist and national funds. Investments under this scheme had fewer restrictions than RVCF or VCT investments, but the maximum investment size was £100,000, without the potential for follow-on (DTI 2006a).

The University Challenge Fund (UCF) was launched in 1999 around the provision of seed capital to facilitate university spin-outs. Universities generally launched consortia to bid to receive these funds, which then provided seed funding worth between £5,000-250,000 to any spin-outs coming from the universities in a given consortium (Hall 2003 p.5). Overall nineteen funds representing 59 universities were created, with the collective investment in the nineteen funds was £60 million (DTI 2006c). Funding for spin-outs receiving investment was typically limited to small, seed amounts.

The Enterprise Capital Fund (ECF), as mentioned in Section 5.2.5, represented a change in policy, with a move toward a 'hybrid' fund approach where the government was one of many partners and the focus was on modifying the risk/reward ratio for private investors. Firms eligible for ECF funding could receive up to £2 million. Some restrictions on sector were implemented, but these typically reflected state aid concerns rather than asset-backed sectors, as seen in the VCT sector (BIS 2008).

Finally the data includes equity investments made by the national governments of Wales, Scotland and Northern Ireland. Many of these investments were made in organisations based around the premise of local economic development, but in general these did not come under the aegis of particular, government-identified schemes. The one exception is the Scottish Co-Investments Fund, which provided matching capital for equity investments made in Scottish firm by private investors.

As with the discussion of VCTs, it is also important to note that these schemes are not necessarily synonymous with the private venture capital sector. Again even though some of these schemes are privately run by professional VCs, the restrictions on investments (and particularly issues such as follow-on funding) mean that these do not necessarily make for pure examples of UK venture capital.

### **6.2.3 Empirical literature on the VCT and post-1998 schemes**

Despite the prominence, cost and perceived importance to the UK economy, there is relatively little academic literature on the VCT and post-1998 programmes. To date they have primarily been the target of government-backed evaluations, many of which have not been published academically. This section will discuss the findings of the existing literature, and identify the gaps that this chapter seeks to fill.

The VCT programme (and its sister EIS) had been discussed in several policy documents that led ultimately to the publication of the 1998 White Paper on Competitiveness. Several of these reports, including the Bank of England (1997), House of Lords (1998), and Williams (1998) reports, were critical of the exploitation of the VCT scheme by fund managers whose offerings complied with the letter but not spirit of the scheme, largely by making asset-backed investments rather than ones that involved any significant risk. These assertions were generally expressed without any quantitative evidence.

The first major study of the VCT and EIS schemes was published in 2003 in a report by Boyns et al (2003). The report was a wide-ranging evaluation of all facets of the two programmes, based on survey questionnaires distributed to VCT and EIS investors (with approximately 500 and 1000 responses, respectively); telephone interviews with approximately 75 investors in each scheme; questionnaire-based interviews with 279 VCT- and 500 EIS-backed firms (including 50 in-depth interviews with firms from each scheme); and approximately 150 interviews with investment advisors who referred clients to one of the schemes. The goals of the study were to assess the impact of the schemes of availability of finance to small firms; to learn how the firms in question

had used the funding, and the effect the funding had had on their performance; and to assess the broader economic impact and cost effectiveness of the schemes on the funds in question.

The results of the analysis suggested that the schemes had positive effects. Boyns et al found that both schemes had been successful in achieving their aims. They estimated from survey data that 70-85% of firms receiving VCT backing would not have received external backing had the VCT scheme not been in place (2003, par. 8.3.1). At the same time, some of the firms that received VCT funding could have received funds from elsewhere (par 5.3.1-2), so it called into question whether the VCT scheme was truly filling a 'funding gap'. Similarly, whereas EIS-backed firms tended to use their funds to support expansion, VCT firms were found to use the money raised to support MBOs and MBIs (par. 8.3.3). The economic benefits of the scheme were found to be that for every £1m invested, VCT-backed firms increased sales turnover by £0.6m and added 9 staff (par. 5.7.26).

This report was followed by a legal and finance analysis of the scheme in (Cumming 2003). This was less a full assessment of VCT performance than a description of the legal circumstances under which they exist, followed by a brief and simple quantitative analysis of fund performance. This work also fed into later comparisons (Cumming and Macintosh 2003, 2007) of the VCT scheme and the Canadian Labour-Sponsored Venture Capital Companies (LSVCC) scheme<sup>28</sup>.

The most recent evaluation of the VCT and EIS schemes (Cowling et al 2008) provides a rigorous econometric analysis of the performance of firms receiving EIS and VCT funding. Using HMRC data on firms that received funding from both schemes, Cowling et al constructed a matched-pair sample against a control of over 80,000 other firms and then used the resulting panel data to analyse the impact of the schemes. The study concludes that both schemes (EIS in particular) build

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<sup>28</sup> The LSVCC scheme operates on a similar business model to VCTs except they are formally linked to unions, which are responsible for their management. Cumming and Macintosh (2006) identify 'crowding out' effects among LSVCCs, which offer better terms and fewer conditions to the firms they back, subsequently attracting firms that would otherwise have received backing by 'proper' VCs. Whether such a phenomenon may be identified as an effect of the VCT scheme is an area for further research.

capacity in the firms that receive investment, facilitating fixed asset formation (p.33-34) and encouraging growth (p. 37), although it also finds the effect sizes for these two interventions to be expensive and comparatively quite small (p. 51). It also found that firms backed by EIS or VCT (but not both) had lower survival rates than those firms that did not have government backing at all (p.42).

The post-1998 have had comparatively less evaluation, though this has in part due to the later beginnings of the scheme. The best review to date was the study by Nightingale et al (2009), which replicated the methodology of Cowling et al (2008) but applied it to the range of government interventions after EIS and VCT, specifically RVCF, EGF, ECF, UCF and the national schemes of Scotland and Wales. Nightingale et al found that these schemes had generally been successful in general capacity building, but again at a high cost: of the 782 recipient firms, the additional number of jobs created by under the schemes was 1,407, meaning approximately 1.8 additional jobs per firm (ibid par 7.1). It also found relatively little impact on profit margins, suggesting that a 'pump priming' effect, in which high returns would be generated with an initial amount of funding, was not present (ibid par 7.2). Ultimately the report found that these schemes typically had roughly similar capacity building effects to the VCT and EIS schemes, although again these effect sizes were quite small. Further, it suggested that supply-side interpretations of the failings of the VC system were not well-founded, as there were significant issues relating to the lack of demand for growth capital as well (ibid par 8, p. 20).

These studies have identified general aspects of these programmes, but have left considerable amounts underexplored, particularly in relation to the topics discussed in Chapter 5. In particular there has been little analysis of the success of these schemes (particularly VCT) in meeting their intended aims. Similarly, characteristics of demand and particularly exit have not been addressed in these, despite the ongoing rationale behind these investments that they would 'demonstrate' the profitability of small firms to investors. We will now frame the background and terms of our quantitative investigation into these topics.

### 6.3 *Framing and method for quantitative analysis*

The intent of this chapter is to provide detailed quantitative analysis of the success and characteristic of publicly-backed equity investments in the UK since 1995. In line with the review of literature above and the conclusions of Chapter 5, there are four main topics that will be addressed empirically here. These relate to the effectiveness of the VCT scheme in directing funds to early stage firms, particularly compared to later, more targeted schemes; the quality of the pool of investments overall, which would support a more demand-side interpretation of the 'equity gap' issues; the nature and type of exits available to investors; and the potential existence of different sets of capabilities in the UK VC sector. These issues and how they will be framed are discussed below.

#### **6.3.1 Research question I: Effectiveness of schemes in directing funds to targeted firms**

As discussed in Chapter 5 and Section 6.2 above, many of the government policies directed toward small firms have been oriented toward supply-side intervention. The studies discussing these schemes above contained insightful analysis of their impact on firms and the broader economy. However, these are in many cases based on a key assumption that the schemes in question are successfully distributing funds to the firms that are being targeted by these particular government interventions. If this assumption (that government's intended outcomes are being perfectly translated into the desired actual investments) is taken as true, the results of these studies would then directly measure the success of the schemes in question.

Yet it is not entirely clear that these programmes are directly fulfilling their initial purposes. As discussed above, official reports including the Williams (1998) and Lords (1997) expressed concern that the VCT scheme was regressing to support asset-backed investments, as had the BES scheme. Similar hints of scepticism have been raised about the RVCF scheme in the media (Guthrie 2007 p. 9) and Parliament (Lords HL5297, HL5298 2009). However these issues have not thus far been examined quantitatively. It is therefore of crucial interest that, beyond evaluation of just the economic impact of any particular programme, that we also

consider the effectiveness of this programme as a delivery mechanism for the funds to reach the intended recipient. This chapter seeks to redress that issue and fill the corresponding gap in the current policy understanding by analysing the success of a number of UK government-backed schemes in dispersing funds to firms with the appropriate ‘target’ profile, i.e. early stage firms.

We will do this in two ways: first we will use descriptive data on the VCT sector to attempt to understand the extent to which VCT investments attempted to flout rules to make more asset-backed or protected investments.

Secondly, we will seek to determine if there were significant changes in investment patterns between VCTs and the post-1998 schemes. The previous chapter argued that there was a subtle shift in the market failure rationale seen in the BES and VCT schemes with the introduction of the post-1998 schemes. While the market failure rationale was maintained, no longer were consumer investors incentivised to invest in small firms; instead the incentives were directed at institutional investors to support these firms. We therefore hypothesise that the shift away from consumer-based investment and toward institutional-based investment will have resulted in a more successful distribution of funds to early stage firms.

### **6.3.2 Research question II: Quality of firms as potential investments**

The struggles of supply-side policy approaches and the role of networks in the generating demand in the case of the US would lead to the suggestion that there may be demand-side issues in the provision of capital for small firms. This is a necessarily tricky issue to address quantitatively for several reasons. First, the issue of firm quality is subjective, and it is difficult to clearly categorise whether a firm that has not received investment is a ‘good’ or ‘bad’ firm. Secondly there is a natural counterfactual issue present in these areas, which is related to the issue of quality above; it is difficult to say how successful a ‘good’ firm would have been had it received funding that was not forthcoming. Finally there is the broader question of the method for determining the quality of firm. Given that the results in Nightingale et al (2009) suggest that there was little or no selection effect among

firms that received VC investment against a broad pool of similar randomly selected firms, there is an additional methodological challenge.

In order to address this, the chapter will look at broad investment trends across the entirety of the VCT sector. Given the size and scale of investments made by funds in the sector, general indications of returns across the broad sample will allow us to draw initial conclusions that would support a demand-side view. If the returns are generally positive, this would suggest that either (if VCTs show a selection effect) that VCTs are making particularly good investments, or else (if there were no selection effect) there are many good investments, and VCTs stumble upon only some of them. Similarly if the broad returns are middling or poor, this would suggest that either VCTs are making particularly good or bad investments if there is a selection effect, or else, if not, the entire pool of firms from which they are selecting is limited in quality. Given that we see from Cowling et al (2008) and Nightingale et al (2009) that there is little selection effect for VCTs, this then suggests that overall results may be interpreted as a loose proxy for firm quality. If VCT investments on the aggregate perform well, this suggests that there is quality among the available stock of firms. However if they do not perform well, it would suggest a lack of quality is present. This hypothesis will be tested with a series of descriptive analyses drawn from the VCT dataset.

### **6.3.3 Research question III: Exit patterns of equity investments**

In addition to demand-side challenges for small firms, there are also issues surrounding the nature and availability of exits for small firms, as discussed in Section 5.4. The historical analysis has discussed the challenges in achieving large IPOs in the UK, and suggests that AIM may not be successful in developing large IPOs such as those seen under NASDAQ in the US. This area is crucial in that it drives returns, which then dictate further investment in the sector. Mason and Harrison (2003) discuss the intention of the Regional Venture Capital Fund scheme to “demonstrate to potential investors in early-stage venture capital funds that robust returns can be made by funds investing in the equity gap” (p. 856). Further, Murray (1994) suggests that the form of exit may be linked to a second equity gap where investors are not able to assemble enough money to fully



develop a firm, and must therefore sell their stake. This then results in a vicious circle where lack of funds drives poor returns, which then dissuades further investment.

Despite the immediate policy relevance of this area, there has been comparatively little data examining exit patterns within investments in the UK. Jeng and Wells (2000) provide data taken from EVCA yearbooks which seems to include VC and PE deals included in the same category (the data suggest that 45% of UK investments achieved exit via IPO in 1995, compared to 36% via trade sale in the same year). Murray (1994) discusses a survey of venture capitalists that finds them generally preferring trade sales and MBOs as forms of exit over IPO (p. 69-71). However although the topic has received discussion, there has been room for additional, more contemporary research. The research question in this section seeks to understand whether trade sales remain the primary means of exit for small firms within this sample, or whether other forms are more prominent or lucrative. The nature of the data mean that there will naturally be some selection biases (particularly for the post-1998 dataset, where exits may not have been reported by Library House and may have been missed by subsequent corroborating examination), but the intent is to provide insight into the nature and value of exit for investors.

#### **6.3.4 Research question IV: Different capabilities in the UK equity investment sector**

One suggestion of Chapter 5 was that the UK VC sector has evolved around different capabilities than those seen in the US. Further, it suggests that there have been a series of different capabilities that have evolved within the VC sector, namely with generalist VCs maintaining the screening and staging capabilities that were initially developed in ICFC, while technology-specialist VCs maintain different capabilities and different skill sets.

Examining these capabilities quantitatively is necessarily difficult, and the data used in this chapter is not entirely suitable for making a concrete claim on this hypothesis. However in light of this there will be an initial exploration of these

topics using this dataset. This provisional exploration will present some early data that may be interpreted to give evidence of different capabilities present in the dataset used.

### **6.3.5 Research methodology**

In order to answer these research questions described above we will perform a series of descriptive and econometric analyses on the data described in Section 6.4. Research questions I and III will be addressed following the same general method used in Cumming (2007). The Cumming paper seeks to examine the likelihoods that different types and generations of Australian Innovation Investment Funds programme, which is a hybrid public-private VC scheme not dissimilar to several of the schemes in the UK. Similarly to the research question discussed above, Cumming seeks to evaluate not the overall economic impact of the IIF scheme but its success in meeting its overall goals. These goals are achieved by investing in early-stage and high tech investments; by IIFs screening, monitoring and adding value to their investments; and by exiting successfully (ibid p. 194).

This may be achieved by using a logit model to examine the likelihood that an investment will be made by a particular type of fund. Logit analysis is used to predict the likelihood of a dependent variable using categorical and numerical predictor variables. For instance, logit analysis could be used to predict the likelihood of a person having a heart attack using variables including gender, age, and smoking. Logit analysis is commonly used in the social sciences (see Mood 2009 for a discussion of uses and misuses of the technique in sociology). The technique has also been used widely in the study of the venture capital sector, see Gompers and Lerner (1999), Kaplan et al (2002), and Baum et al (2004).

In analysing these results in an economic sense, care must be taken in the interpretation; we are not seeking to explore the relative probability that an investment will take place (such as if we were trying to determine risk factors for a heart attack). Greene (2000 p. 815) suggests that “the parameters of the logit model, like those of any nonlinear regression model, are not necessarily the marginal effect we are accustomed to analysing. In order to gain meaningful

results from the logit equation the marginal effects of the model must be used, while still checking the significance of the coefficient (ibid p. 815-6). These marginal effects allow us to determine the probability that the dependent variable is being observed as a direct result of the explanatory variable.

Cumming's approach is to break down the dataset's categorical variables for investment type and exit (as well as several other variables not used in this study) into a single binary variable (Cumming 2007 p. 211, 218-220). For instance for a variable 'Venture capital' firms having received VC backing would be coded as '1' and all other firms not having received the same backing would be coded as '0'. This would then be used as a dependent variable against which other quantitative and categorical variables may be considered. Cumming breaks down these categorical characteristics of investments into binary forms, and then uses the different types of IIF funds as the independent variables (ibid).

We also adopt the set of controls used by Cumming. There are several controls used, including for the year of the initial investment, and a binary variable that equals one for investments made in the years 1999 and 2000. This is to control for investments made in the peak of the dot-com bubble. Finally we also use a control for overall market performance in the year of investment. This is done using the Morgan Stanley Capital Index (MSCI) for the UK, which provides a general proxy for annual performance of equity markets in a given country, in the period given based largely on LSE performance.

The advantage of adopting Cumming's method for answering questions I and III comes from the similarity of data and purpose between the two topics. Cumming is seeking to identify the relative likelihood that a government backed intervention will make certain types of investment, which is common with the intent of this project. The nature of the data available (as discussed below) also suits this type of technique, given that we have basic information about the firms but not necessarily panel or time series data, and the comparability between the two datasets is limited by the data itself.

## 6.4 *Construction and descriptive variables for the datasets*

### 6.4.1 **The VCT dataset: construction and specifics**

The VCT scheme has a number of unusual features that sets it apart from other government backed schemes, but one that is perhaps the most unusual (and thus far under-exploited) is the requirement that all VCTs must list themselves on the London Stock Exchange as a condition for their tax accreditation. This measure likely seeks to prevent fraudulent activities by VCT fund managers by binding them into securities rules. At the same time listing on the LSE also brings with it full securities disclosure requirements for all VCTs, and this has not significantly been significantly<sup>29</sup> exploited previously by academics or policymakers. The dataset discussed in this section utilises these disclosure rules to create a unique and comprehensive database of investments made by the entire universe of VCTs from 1996-2005/6.

The VCT dataset was created by hand, based on VCT securities filings harvested from the Thomson One database. Funds were identified using a combination of search strings and existing lists of VCTs (from sources such as Trustnet). Ultimately data was gathered for 161 VCTs. This number includes funds that completed initial securities filings but did not meet fundraising targets, as well as funds that changed names<sup>30</sup>. Once name changes, aborted listings and duplicates had been addressed, annual and interim reports for each VCT were accessed and downloaded onto a central location. In total, 1367 documents were accessed. At the time of access (March 2007), virtually all reports for 2005 were available online, and many reports for 2006 were available as well. In a very small number of instances one year's annual report or interim report would be missing or mislabelled, and other annual reports and information sources were used to triangulate missing data.

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<sup>29</sup> The website Trustnet.com seems to use some securities filings to provide tracking and performance data on various investment trusts, but does not use it to track specific investments.

<sup>30</sup> In the VCT sector it is common for funds to carry the branding of the fund manager, but because VCTs are independent companies with their own governance, in a number of cases VCT boards have sacked and replaced the fund managers (thereby necessitating a corresponding name change) or have sought to rebrand themselves based on particular sectors or focus of investment. For instance, the Advent 2 VCT changed management teams and became Foresight 4 VCT, while the Matrix E-Venture Fund VCT became Matrix Venture Fund VCT, and then changed again to Matrix Income and Growth 2 VCT.

Once the documents were collected, they were examined and investment data were extracted from each annual or interim report and inputted into a database using Microsoft Access. The variables collected included VCT name, firm name, date of investment, initial level of investment<sup>31</sup>, listing status of the firm, type of deal, and sector of firm for all investments, and value of exit, year of exit, and type of exit (with the possibility of multiple exits, as often happened for actively-managed AIM stocks) for investments that had been exited. Exit data was not always clear – some funds made their exits obvious, while others were very general about their exits (although these were often the AIM-specialist funds which actively managed portfolios). After coding the records (particularly variables for investment type<sup>32</sup> and exit type) were then verified against other records within the dataset and via firm literature, websites, and other information.

The variables coded include:

#### **Firm Name**

#### **VCT name**

**Sector**<sup>33</sup> - The sector of the firm was coded using the ICB classification system, which allowed for more nuanced breakdown of technology-based sectors (these are listed in Table 6.4.2 below).

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<sup>31</sup> The reporting style often made it difficult to identify whether an initial investment was being given out in tranches or whether follow-on investments were being made. The distortion seems to be more due to tranche funding rather than follow-on investments, so initial level of investment was judged to be the most representative level of funding received by the firm.

<sup>32</sup> The typology for investment around product development matches that used in Cumming (2007). This required examining individual investments and coding them by hand based on the product development stage. Most annual reports had descriptions of new firms receiving funding, which made the process relatively straightforward. One complication was for services firms, which have different product development issues and thus do not directly map onto this framework. In this case firm age was used as a proxy.

<sup>33</sup> One methodological issue between the datasets used in this analysis related to the coding and use of sectoral data. The VCT sectoral data was based on the Industry Classification Benchmark (ICB) classification system used by the LSE and AIM, while the post-1999 dataset was based on SIC codes. The ICB system used for the VCT database is reflective of a range of technology sectors, rather than the much more limited SIC codes for technology sectors, which often consider firms based around science or R&D activity as one category. This means that biotechnology, semiconductor design and some software companies may all be linked in the same category. This was an issue with the post-1999 dataset, and it also affected the comparability of sectoral data variables between the VCT and post-1999 datasets. Consequently apart from the descriptive variables given in this table and

**Total Investment** – This figure was recorded for the total of all investments and follow in investments in a given firm made by a given VCT

**Investment Type** – Each investment was coded based on the description of the investment. These were coded as VC (early stage); Expansion (later stage); MBO/MBI; AIM (initial placing on AIM); and Shell (relatively rare, but used when a VCT was organised as a holding company for another firm). These were later broken out as individual binary variables.

**Exit Value** – Where exits were made, the value of that exit was recorded. If there were multiple exits, these were added to create a total value.

**Exit Type** – As above, these were coded based on the description on the exit in the documentation. These included IPO (exit via full IPO on the LSE); Market exit (exit via AIM); Trade sale (exit via sale of company); MBO (buying out the VCT's share); and Write-off (company fails).

#### 6.4.2 Descriptive overview of the VCT data

The complete dataset consists of 97 unique funds (see footnote 31 above for further detail), ranging from those founded in 1995 to those established in 2006. Of these funds, 59 were generalist, 27 were AIM-specialist; and 11 were sector specialist. The data set consists of approximately 4000 investments made by VCTs from 1995 to 2006. Because the data are taken from securities filings, there is time lag, because that the full number of investments for 2006 was not yet available; however because of the increase in the tax credit for VCT investments from 2004-2006, we can safely assume that the levels of VCT investments will be higher than in 2003-2004. The investments are worth a total of £1.5 billion.

The dataset has been formatted into two 'cuts' – one that is based on individual investments made by individual VCTs and one that is oriented toward the firm level. The prior, whilst useful for analysis of portfolio activity, is less appropriate for the scope of this analysis, but does provide some unique insight, so this section contains brief descriptive data for both 'cuts' of the VCT dataset, with emphasis on

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similar subsequent tables, sectoral data is not included in these analyses. A major priority for future work will involve the harmonisation of the two datasets for sectoral data.

the firm-orientated dataset from which the analysis in subsequent sections will be based.

Table 6.4.2 below presents some initial descriptive data for the investments made. For binary variables, marked with an asterisk (\*), the mean variable gives an indication of the relative commonality of the characteristic in the dataset; for instance, a binary variable with a mean of 0.5 would indicate that half the cases in the dataset had the characteristic, and were thus equal to one, while the other half did not and were equal to zero.

**Table 6.4.2 Descriptive data for the VCT dataset**

	Mean	Std. Deviation
Initial investment (000)	1080	979.177
Year of initial investment	2.00E3	2.842
VC investment*	.2238	.41692
MBO investment*	.1460	.31489
Shell investment*	.0492	.21627
AIM investment *	.3749	.48428
Expansion investment*	.2040	.40309
Computer hardware, semiconductors, etc <sup>34*</sup>	.0389	.19339
Software and computer services*	.1585	.36532
Biotechnology and pharmaceuticals*	.0550	.22811
Electronics and electricals*	.0330	.17874
Media*	.0800	.27135
Write off*	.1152	.31936
Exit via MBO*	.0103	.10086
Exit via IPO*	.0117	.10775
Exit via Market*	.1284	.33465
Exit via sale to other firm*	.0990	.29883

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<sup>34</sup> One methodological issue between the datasets used in this analysis related to the coding and use of sectoral data. The VCT sectoral data was based on the Industry Classification Benchmark (ICB) classification system used by the LSE and AIM, while the post-1999 dataset was based on SIC codes. The ICB system used for the VCT database is reflective of a range of technology sectors, rather than the much more limited SIC codes for technology sectors, which often consider firms based around science or R&D activity as one category. This means that biotechnology, semiconductor design and some software companies may all be linked in the same category. This was an issue with the post-1999 dataset, and it also affected the comparability of sectoral data variables between the VCT and post-1999 datasets. Consequently apart from the descriptive variables given in this table and similar subsequent tables, sectoral data is not included in these analyses. A major priority for future work will involve the harmonisation of the two datasets for sectoral data.

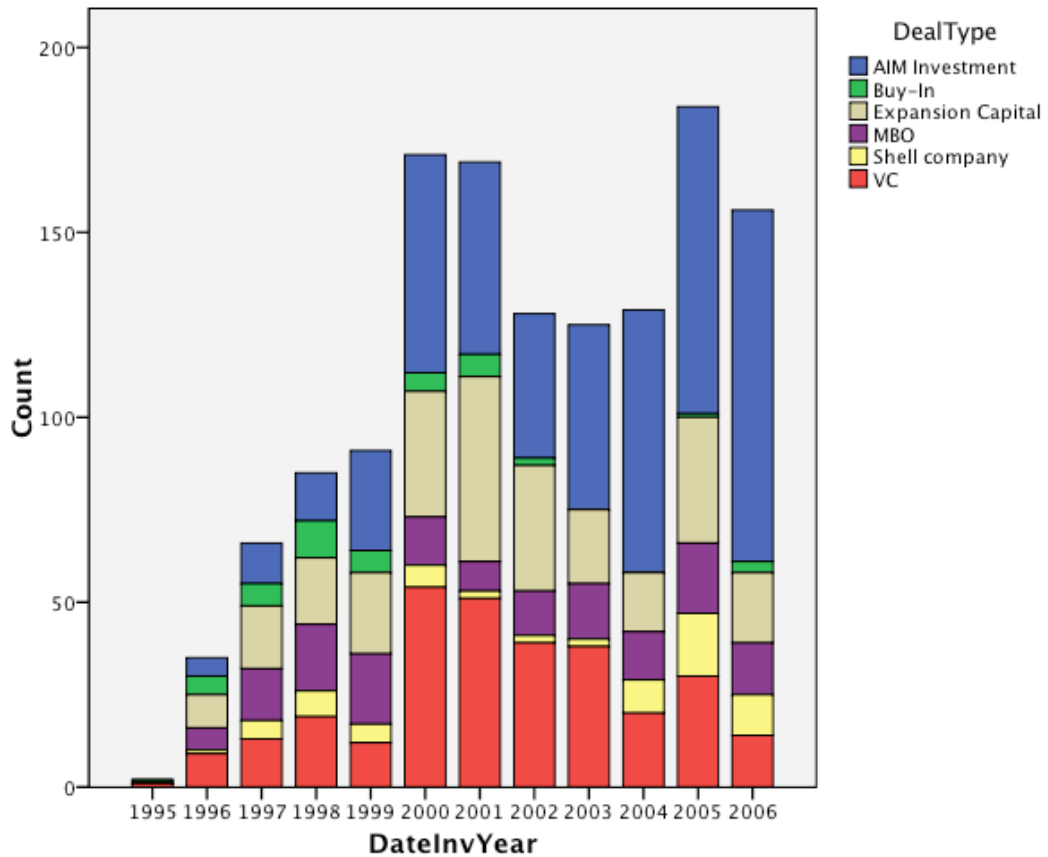


Table 6.4.3 VCT Investments by Investment Type and Year

Deal Type	Year of Investment												Total
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	
AIM Investment	0	5	11	13	27	59	52	39	50	71	83	95	505
Buy-In	1	5	6	10	6	5	6	2	0	0	1	3	45
Expansion Capital	0	9	17	18	22	34	50	34	20	16	34	19	273
MBO	0	6	14	18	19	13	8	12	15	13	19	14	151
Shell company	0	1	5	7	5	6	2	2	2	9	17	11	67
VC	1	9	13	19	12	54	51	39	38	20	30	14	300
Total	2	35	66	85	91	171	169	128	125	129	184	156	1341

Table 6.4.3 and Figure 6.4.1 show the annual number of firms receiving investment, broken down for types of investment. As we can see, the market for AIM investments has grown with the development of that market, growing in share at the expense of VC level investments. The growth in early stage investments in 2000-2001 in the wake of the dot-com bubble is striking, as is the sharp decrease in early stage and expansion stage investments in recent years.

**Figure 6.4.1 VCT Investment Type by Year**



#### 6.4.3 The Post-1998 funds dataset: Construction and specifics of the dataset

The other dataset used here consists of data regarding the investments of the various other government-backed schemes developed in the 1999, including the Regional Venture Capital Funds, Early Growth Funds and University Challenge Funds; the Enterprise Capital Funds, launched in 2006, and regional schemes in Wales, Scotland and Northern Ireland. This section will discuss the collection and creation of this dataset<sup>35</sup> and provide initial descriptive data and some initial analysis.

<sup>35</sup> This dataset was created as part of the project discussed in Nightingale et al (2009), although the dataset used here is more refined and has additional data not included in the Nightingale et al

Whereas the VCT dataset discussed in the previous section was able to take advantage of unusual disclosure rules to generate a complete dataset, such measures were not possible for the funds considered here. Instead data was collected and triangulated from a number of sources. The main source was the Library House (LH) database, a commercial (albeit now-defunct) database that served as a clearinghouse for information about high growth entrepreneurial firms throughout Europe. The LH data was gathered by LH staff, who contacted firms and funders regularly to gain information about funding rounds, and would then triangulate this data with industry contacts and other sources.

In constructing the dataset, each individual fund backed by the schemes listed above was identified, and used to collect the corresponding LH investment records. These lists of investments were then cross-referenced and corroborated with the websites and publications of the fund involved in the various schemes to ensure completeness. If fund literature gave the name of a firm as having received investment but the firm was not listed in the LH database, other sources were used to replicate the data provided by the Library House. After extensive verification and cross-referencing, the data were coded and entered into a database. The database is somewhat different in its orientation to the VCT dataset, in that the VCT data is aggregated only by VCTs that provided funds to a given firm, whereas the LH-derived data provides data on a firm's entire funding history. Consequently, the initial amounts invested in the two datasets cannot be directly compared, because the data collection for each variable is different. For instance, in cases where the same firm was included in both datasets, the VCT values for investment would be lower because they would not include other funding sources.

The variables collected in the post-1998 dataset are generally similar to those for the VCT dataset (apart from the collection issues discussed above). Variables that are available in the post-1998 dataset that are not available in the VCT also includes the number of rounds of investment each firm is recorded as having made

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paper. It includes all investments in Northern Irish firms, as well as additional new variables for angel investment. The analysis presented in this chapter is original.

on Library House; whether a firm is a university spin-out; and whether the CEO is a professor. Descriptive data for these variables are available in Table 6.4.5.

#### 6.4.4 Descriptive data for the post-1998 dataset

The post-1998 dataset consists of 779 firms. Of these firms, the distribution of investments among schemes is presented in Table 6.4.4. There are a number of interesting trends here. The regional schemes were typically most often parties to larger investments, while the RVCF scheme, despite making the most investments, had the lowest mean value, suggesting that the firms receiving RVCF backing were least likely to receive larger follow-on funding. The data for the ECF scheme, which started later, is less complete, which provides some explanation of the outcome of these results.

**Table 6.4.4 Investments made by government-backed schemes in the post-1998 dataset**

	Number Investments	Mean Investment Value (,000)	Mean Number Investment Stages
RVCF	240	911	1.63
EGF	139	1480	1.79
UCF	203	2353	2.15
ECF	40	3450	1.52
Wales	46	4261	1.91
Scotland	164	4850	2.31
N. Ireland	19	4664	1.93
Multiple	66	2003	3.03
Dataset Mean	114	2472	2.03

Additional descriptive values for the binary variables relating to investment and exit characteristics is provided in Table 6.4.5. As we can see, early stage 'VC' investment is the most common, followed by expansion funding. MBOs seem to be

less common. The most common form of exit is failure, followed by trade sale. IPOs and MBOs are considerably less common.

**Table 6.4.5 Mean values for binary variables in post-1998 dataset**

	Mean	Std. Deviation
RVCF*	.3081	.46200
Early Growth Fund*	.1784	.38312
University Challenge Fund*	.2606	.43924
Enterprise Capital Fund*	.0513	.22085
Scottish Funds*	.2105	.40794
Welsh Funds*	.0591	.23587
N Ireland Funds*	.0244	.15436
Multiple Funds*	.0847	.27865
University spinout*	.32	.469
CEO professor*	.0411	.19860
VC investment*	.5404	.49868
Expansion Investment*	.4519	.49800
MBO*	.0000	.00000
Total Invested (,000)	2472.46	7151.548
IPO Exit*	.0321	.17636
MBO Exit*	.0167	.12818
Out of business*	.09	.286
Tradesale_Exit*	.06	.243
Year of initial investment	2003.91	3.121

#### **6.4.5 The combined dataset**

The two datasets discussed in Sections 6.4.1 and 6.4.3 were merged into a common dataset. In cases where firms were common among the two datasets (approximately 30), the dates and stages of investments were compared; if the investments were made in the same year and at the same stage they were considered to be part of the same round of investments and the data were merged. If there were investments in the same firm but at very different stages in development (for instance, an early stage investment made by a University Challenge Fund in 2001 followed by an AIM flotation backed by VCTs in 2005), the

two investments were deemed to be discrete and were retained as separate entities.

The variables used in this database reflect the variables in the previous two datasets, and include:

**Early\_Stage:** This was used for firms that did not have their main product on the market and were using their investment to further develop and invest in a new product.

**Expansion\_Capital:** This was used for firms that had products already on the market and were using the investments to fund further growth.

**MBO:** A binary variable which equals 1 if the firm received its initial investment in support of a management buy-out

**IPO:** A binary variable which equals 1 if the investment was exited via some form of IPO

**Acquired:** A binary variable which equals 1 if the investment was exited via the sale of the firm to another firm

**Acquired\_value:** If available, the value of the final sale of the firm.

**MBO\_exit:** A binary variable which equals 1 if the firm underwent an MBO in which the VCs sold their shares in the firm.

**Writeoff:** A binary variable which equals 1 if the investment had been written off due to firm failure.

**RVCF:** A binary variable which equals 1 if the firm received investment from a Regional Venture Capital Fund.

**EGF:** A binary variable which equals 1 if the firm received investment from an Early Growth Fund.

**UCF:** A binary variable which equals 1 if the firm received investment from a University Challenge Fund.

**ECF:** A binary variable which equals 1 if the firm received investment from an Enterprise Capital Fund.

**Scotland:** A binary variable which equals 1 if the firm received investment from any fund run by Scottish Enterprise or any of the Scottish regions.

**Wales:** A binary variable which equals 1 if the firm received investment from any Fund backed by the Welsh enterprise authority.

**N\_Ireland:** A binary variable which equals 1 if the firm received investment from the Northern Ireland enterprise authority.

**Regional:** A binary variable which equals 1 if a firm received investment from any of the Scottish, Welsh or Northern Irish funds discussed above

**Multiple:** A binary variable which equals 1 if the firm received investment from more than one fund

The merged dataset has 2141 entries. A fuller description of the data is presented in Table 6.4.6

**Table 6.4.6 Descriptive data for combined dataset**

	Mean	Std. Deviation
Investment (000)	1525.50	4159.340
Bubble year investment	.1471	.35432
ECF	.0131	.11364
EGF	.0532	.22458
Multiple Investments	.0308	.17289
Regional Funds	.0986	.29813
UCF	.0733	.26074
RVCF	.0948	.29303
VCT	.6362	.48122
1995 Funds	.6362	.48122
1999 Funds	.2214	.41528
2006 Funds	.0131	.11364
VC	.3382	.47319
MBO	.0738	.26150
Expansion Capital	.2947	.45602
AIM Investment	.2396	.42694
Management Buy-In	.0220	.14656
MBO and MBI	.0957	.29432
Electronics	.0761	.26527
Telecommunications	.0215	.14503
Software Design and Consultancy	.0518	.22177
Hardware Consultancy	.0308	.17289
Biotech and IP Exploitation	.1060	.30794
MBO exit	.0126	.11161
Trade sale exit	.0817	.27403
IPO Exit	.0131	.11364
Write-off	.1004	.30063

The dataset naturally is more oriented toward the VCT investments, given the longer range and time period, and the larger scale of the VCT programme.

### *6.5 Research question I: Effectiveness of interventions with different structures*

Here we seek to examine the effectiveness of the VCT scheme compared with later schemes in its ability to direct funds to early stage firms. This analysis involved the combined dataset, and saw all investments aggregated into three categories: VC (or early stage); expansion stage; and MBO/MBI. Logit regressions were performed with independent variables including the various schemes (in two formulations), as well as timing and market variables as in Cumming (2007). The model used here is a logit regression where the left-hand-side variables equal one

if the firm received its initial investment when it was at that stage (for instance early stage for equations (1) and (2), expansion for (3) and (4), etc). Different formulations of the right-hand-side variable were used to ensure robustness of results. These results took the form of a formulation that included the each post-1998 fund separately, as well as one variable (1998\_Funds) that included all post-1998 funds. This grouping did not include the Enterprise Capital Fund, which (due to its creation in 2003) was not part of the same conceptual grouping as the other post-1998 funds and which had a small number of firms in the sample such that multicollinearity issues began to emerge.

The model used in Equations (1), (3), and (5) was

$$[\text{Exit stage}] = \alpha + \beta_1[\text{VCT}] + \beta_2[\text{RVCF}] + \beta_3[\text{EGF}] + \beta_4[\text{UCF}] + \beta_5[\text{ECF}] + \beta_6[\text{Regional}] + \beta_7[\text{Multiple}] + \beta_8[\text{MSCI}] + \beta_9[\text{InvYear}] + \beta_{10}[\text{Bubble}]$$

The model used in Equations (2), (4), and (6) was

$$[\text{Exit stage}] = \alpha + \beta_1[1995\_Funds] + \beta_2[1998\_Funds] + \beta_3[\text{Regional}] + \beta_4[\text{Multiple}] + \beta_5[\text{MSCI}] + \beta_6[\text{InvYear}] + \beta_7[\text{Bubble}]$$

Table 6.5.1 provides logit regressions of the probability of investment at different stages of firms' development, and finds strongly significant chi-square results. The results in this table are the effect size, which shows the propensity of a given characteristic to occur in a given stage. Therefore the analysis finds that VCTs are nearly 50% less likely to invest in expansion-stage capital than the other firms in the sample, and 11% more likely to invest in MBO/MBI deals. Given the previous descriptive data and concerns discussed in policy circles, this is not surprising, although one might have expected significant results suggesting a disinclination by VCTs to invest in early stage firms. As it stands the marginal effects sizes are large but not significant.



**Table 6.5.1 Logit regression for government scheme and investment type**

	Early Stage		Expansion Capital		MBO and MBI	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	73.182	147.672	173.789	46.597	336.834	331.942
<i>Type of fund</i>						
VCT	-0.106		-0.495***		0.112***	
RVCF	0.040		-0.031		0.416	
EGF	0.212*		-0.133**		n/a(1)	
UCF	0.632***		-0.306***		n/a(2)	
ECF	n/a(1)		n/a(1)		n/a(1)	
Funds 1995		-0.137		-0.465***		0.040
Funds 1999		0.253**		0.188***		-0.061**
Funds 2006		n/a(1)		n/a(1)		n/a(1)
Regional	0.120	0.159	-0.139**	-0.128**	-0.020*	-0.060***
Multiple	0.456***	.0443***	-0.236***	-0.239***	n/a(2)	n/a(2)
<i>Market Conditions</i>						
MSCI Investment Year	-0.001**	-0.016***	0.001**	-0.001**	0.000	0.000
First Investment Year	-.0009*	-0.001**	-0.014***	0.005	-0.102***	-0.008***
Bubble	0.077	0.073	-0.072**	-.074**	-0.020	-0.017
<i>Model Diagnostics</i>						
Number of observations	2113	2113	2113	2113	1892	2047
Number observations where dependent variable = 1						
Loglikelihood	-1145.799	-1212.90	-1117.47	-1193.392	-571.714	-573.999
Pseudo R <sup>2</sup>	0.153	0.103	0.1273	0.0680	0.110	0.130
Chi-squared statistic	412.86***	278.65***	326.08***	174.24***	141.99***	170.99***

N/A(1) – In instances where multicollinearity was detected around one variable, that variable was removed for the regression. This means that the Enterprise Capital Fund, the youngest of the schemes in this analysis is not considered as it has a very limited number of investments.

N/A(2) – If an independent variable did not have any positive values in the formulation for a specific model, it was excluded.

It is also somewhat unexpected that the RVCF scheme does not seem to significantly differ from the rest of the group in any of the categories. The very significant results showing the UCF scheme as 63% more likely to invest in early stage firms and 30% less likely to back expansion capital is expected, given the nature of the scheme. However the similar (albeit less strongly significant) results for the EGF scheme are generally surprising. The significant results showing the greater likelihood of post-1998 funds to invest in early-stage investments and expansion capital at the expense of MBO/MBI investments must be seen as an important result.

Regional funds' disinclination to support expansion capital (14% less likely) and MBO/MBI (6% less likely in equation (6)) is particularly interesting given the inclusion of several expansion schemes that received funding through means typically earmarked for small firms. The strong result for early stage and expansion capital for those investments that received investments from multiple government-backed schemes should be interpreted very carefully (given issues of causality) but are encouraging. The significant but minor effects along the MSCI control are to be expected, as is the decrease in expansion capital (presumably in favour of early stage investments) during the bubble period of 1999-2000. A very interesting result is found in the results for first investment year: the significant negative values for MBO/MBI investments (which still must be interpreted carefully given the spread between the two) suggest that government-backed MBO/MBI investments have become less common as time has progressed. The weakly significant smaller effects may be interpreted as being due to the larger size of the VCT scheme (in that there are overall fewer investments from the post-1998 funds), but the continuing decrease in MBO/MBI investment is intriguing.

There are several significant and interesting results from this data, chief among them results that suggest that as time has progressed newer schemes have become more likely to direct funding to capital than the older VCT scheme. Further, investments in MBO/MBI investments may be interpreted to have declined over time. Both of these findings would support the initial historical conclusion that

suggests that later schemes appeared to be more successful than the VCT scheme in directing funding toward early stage firms. However additional work remains to be done exploring these areas.

## 6.6 *Research question II: An initial exploration of demand for capital*

Having found that VCTs tended to invest in other forms of investment, this leads back to the previous discussion of supply and demand-side factors. We therefore use the pool of all exited VCT investments as a rough proxy for the quality of demand for capital; positive results in the area would suggest that the number of investment opportunities is good, while negative returns would suggest a lack of positive opportunities.

This is assessed using a number of pieces of descriptive data from the VCT dataset. For these investments internal rate of return (IRR) was used as a measure<sup>36</sup>. Table 6.6.1 shows the effectiveness of the investments made by the VCTs. These provide valuable evidence of the performance of individual sectors, and show the challenges of the scheme overall in generating positive returns. There are several notable factors in this table, first and foremost the overall negative mean IRR for all years of investment other than the first year of the scheme (1995, in which only three investments were made). It is surprising to see the distribution of returns for these investments. The means for most sectors show losses as well, and the only sector to show positive results is the retail sector. Further, the benefits of the 1999-2000 bubble are very clear from these investments. 1999 was generally the best year in terms of internal rates for return, with the mean of telecommunications investments made providing 374% IRR. However following this period most sectors showed greater levels of losses (though this must be tempered again by the 'lemons ripen faster than peaches' truism, which would suggest that investments from 2003-2006 would be less likely to be exited).

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<sup>36</sup> It should be noted that for these calculations there were typically only beginning and end points (i.e. initial investment and value of exit) and so did not have the multiple valuation points that would normally be seen in IRR calculations.

Additional benefit may be gained by examining investment patterns. If returns on investment were not strong, it is useful to see where the early stage investments were, in fact, being made. Table 6.6.2 shows aggregated annual and sectoral data for investments. It is particularly interesting in this case to note that the peak years for investments in early stage firms was 2000 and 2001, after which investments began to drop off sharply. Some decline may be due to issues with reporting, but in general it seems to show relatively little confidence among VCTs in the early stage sector, other than the bubble years of 1999-2001.

Between these two results, the assertion that VCTs saw relatively few positive investment opportunities is generally supported. The lack of a positive mean IRR for investments made in any year of the programme would certainly be a concern, and the significant weakness in nearly all sectors is similarly discouraging. The low levels of investments in early stage firms outside of the boom years is similarly troubling, in that it suggests that investors did not see early stage investments as being as appealing as other forms of investment. Coupled with the previous results it would seem that MBOs made significantly more appealing candidates for investment than other sectors. Again these are only initial results, but they do provide some support for this assertion.

Table 6.6.1 IRR in Sectors and Years of Investment

Sector	Year of Investment											
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Automobiles & Parts	-	-2.00	-.67	-2.00	-.97	-1.15	-2.33	-.26	-	-	-	-
Basic Resources	-	-.37	-1.93	.67	-	-	-	-	-.68	-	-	-
Chemicals	-	-.71	-	-1.66	4.58	.75	-	-1.06	-	-.65	-	-
Construction & Materials	-	-1.21	-	.29	-.24	-1.71	-2.00	-.18	.40	-1.13	.12	.42
Financial Services	-	-	-.67	-.63	.42	-.86	-1.31	2.40	-.26	-.08	.42	-.42
Food & Beverage	-	-	-2.00	.02	1.28	-.92	-1.25	-.58	-.32	-	-.85	-
Health Care Equipment & Services	-	.69	-1.89	-1.22	.27	-.75	-1.07	-.96	-1.31	-.72	-1.04	-1.43
Industrial Goods & Services	-	-1.25	-.99	-.34	-.62	-1.76	-1.49	-.85	-1.06	.10	-.42	-1.42
Media	-	-1.28	-1.35	-.52	-.87	-1.87	-1.30	-.56	-1.00	-1.14	-	.05
Oil & Gas	-	-	-.59	-	-	-	-	-	-	-.56	-.67	-.90
Personal & Household Goods	-	-.69	-.49	-1.95	-1.14	-.83	-1.05	-1.73	-	-1.03	.00	-
Pharmaceuticals & Biotechnology	-	-	.80	-2.00	-2.62	-.96	.29	-.31	.47	.36	-	-
Retail	-	-.71	-1.32	.10	-1.43	21.78	-.53	-1.89	4.02	4.39	-	-
Software & Computer Services	-	2.53	2.84	5.26	.80	-1.35	-.95	-.60	-.99	-.53	-.89	-.73
Support Services	-	-.63	1.12	-1.02	.29	-1.56	-1.23	-.88	-.41	-.89	-.84	-.42
Technology Hardware & Equipment	1.59	6.93	-1.02	-	-	-1.30	-1.75	-1.41	-.95	-	-.80	-
Telecommunications	-	-	-2.00	-	3.74	-.66	-2.20	-1.62	-2.42	-.65	-.92	-
Travel & Leisure	-	-1.75	-1.05	-1.04	-1.59	-1.55	-.60	-.72	-1.12	-.85	-.65	-.88
Utilities	-	-	-	-	-	-.34	-1.22	-	-	-	-	-

Table 6.6.2 Annual VCT Investments in Early Stage Firms by Sector

	Year of Investment											Total	
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005		2006
Automobiles & Parts	0	0	0	0	1	0	1	0	0	0	0	0	2
Chemicals	0	0	1	1	0	4	0	10	6	3	4	0	29
Construction & Materials	0	0	0	0	0	0	0	0	0	1	1	0	2
Financial Services	0	0	0	0	0	2	4	2	0	0	0	0	8
Food & Beverage	0	1	0	0	0	0	0	1	1	0	0	0	3
Health Care Equipment & Services	0	0	1	6	5	5	5	4	6	1	2	0	35
Industrial Goods & Services	0	0	2	2	5	7	8	0	4	1	5	2	36
Media	0	0	0	0	3	8	10	2	0	2	0	0	25
Oil & Gas	0	0	0	0	1	0	0	0	0	0	0	0	1
Personal & Household Goods	0	0	1	0	0	0	0	1	0	0	1	0	3
Pharmaceuticals & Biotechnology	0	0	1	7	3	6	12	11	10	6	5	7	68
Retail	0	1	0	0	0	0	0	0	0	0	0	0	1
Software & Computer Services	0	2	1	7	13	30	19	16	10	7	8	5	118
Support Services	0	1	1	2	1	4	3	1	1	2	0	0	16
Technology Hardware & Equipment	1	1	0	2	0	4	6	5	4	0	5	0	28
Telecommunications	0	0	0	0	1	0	0	0	6	0	0	0	7
Travel & Leisure	0	0	0	0	0	3	2	3	0	0	0	0	8
Total	1	6	8	27	33	73	70	56	48	23	31	14	390

## 6.7 *Research question III: Characteristics of investment exit*

Given the suggestion of the previous sections that questions the strength of demand, the other area of interest then relates to how easily firms are able to 'cash out' their investments. By examining investment exits we may empirically examine the effectiveness of and type of investments made by the schemes in this sector.

### 6.7.1 Investment exit in the VCT sector

An examination of the exits made by VCTs from their investments is provided in Table 6.7.1. It shows the results from all 950 firms that received VCT funding and had proceeded to exit by December 2006.

**Table 6.7.1 All exits from venture capital trusts**

Exit Type	Number exits (% of total)	Mean Exit Size (thousands)	Median Exit Size (thousands)
IPO Exit	17 (1.8%)	1,326.8	599.0
Trade Sale	245 (26.0%)	607.2	291.0
Market Sale	369 (39.2%)	164.2	54.0
MBO	27 (2.8%)	542.6	272.0
Failure	284 (30.1%)	-470.4	-361.5

This gives an interesting perspective on the results of individual investments. IPO exits were quite rare, but were much more profitable than any other investment. MBOs, traditionally seen as a mark of failure in the VC sector, were also successful. Investments exited on AIM were in many cases AIM-specialist VCTs, which hold large portfolios and sell stocks at small profits. For VCTs trade sales proved to be the most reliably lucrative source of returns. In some cases firms would invest in companies that would subsequently join AIM. Table 6.6.2 breaks down the data further to focus only on exits from firms that were unlisted when they received their initial investment, of which there were 505.

**Table 6.7.2 Exits from VCT investments in originally unlisted firms**

Exit Type	Number exits (% of initial unlisted investments)	Mean Exit Size (thousands)	Median Exit Size (thousands)
IPO Exit	13 (2.6%)	1,608.5	636.0
Trade Sale	200 (39.6%)	664.3	365.0
Market Sale	49 (9.7%)	283.9	65
MBO	22 (4.4%)	684.2	310.5
Failure	221 (43.8%)	-511.8	-381.0

This shows clearly that VCT investors in unlisted firms viewed trade sales as the most realistic, if not most desired option when orienting firms towards exit. True IPO exits remained profitable but rare, and AIM did not provide a great opportunity for widespread, highly profitable exit. Further, the very high failure rates (nearly 44% of investments) would mean that high valuations would be required in order to break even, much less generate significant returns.

### 6.7.2 Investment exit in the 1999 and 2006 schemes

As discussed above, the VCT datasets demonstrate a strong propensity for investors in firms to make exits via trade sale rather than by accessing the markets. This section augments that data with the other dataset consisting of investments made in the 1999 and 2006 government-backed schemes. The 1999/2006 dataset does not comprehensively include the value of exit, but does allow the comparison of exit types across different funds (though in some cases the investment size is indeed very small.

**Table 6.7.3 Exits by type for government-backed schemes**

Exit Type	RVCF	EGF	UCF	ECF	Reg-Scot	Reg. Wal	Reg. NI	Mult.
IPO Exit	4 (10%)	1 (6%)	0 (0%)	0 (0%)	4 (16%)	3 (23%)	0 (0%)	0 (0%)
Trade Sale	11 (29%)	8 (44%)	16 (50%)	0 (0%)	6 (24%)	5 (38%)	2 (100%)	3 (100%)
MBO	4 (10%)	1 (6%)	2 (13%)	3 (100%)	2 (8%)	1 (8%)	0 (0%)	0 (0%)
Failure	19 (50%)	8 (44%)	14 (44%)	0 (0%)	13 (52%)	4 (31%)	0 (0%)	0 (0%)



We see here that even for the most entrepreneurial firms backed by government VC schemes, trade sale remains the predominant form of exit for the firms. This again demonstrates some of the significant ongoing problems in identifying IPO or market-based exit opportunities for these firms.

### 6.7.3 Logit Analysis of Investment Exit

This analysis of the initial funding behaviour was followed by a logit analysis of the likelihood of firms exiting investments in certain ways. As discussed in Chapter 2, it is established cannon in the VC literature that there is a hierarchy of exits: typically IPOs are most heavily favoured, followed by trade sales to other firms, then managerial buy-back and then finally writing off shares (see Kaplan 2006 and Gompers and Lerner 2002). The previous chapter discussed how this particular heuristic has not necessarily matched the UK experience, and this analysis seeks to further that understanding.

The model used here is a logit regression where the left-hand-side variables equal one if an investment was exited in a given way (for instance IPO for equations (1) and (2), trade sale for (3) and (4), etc). Different formulations similar to those in the previous section were used to ensure robustness.

The model used in Equations (1), (3), and (5) was

$$[\text{Exit stage}] = \alpha + \beta_1[\text{VCT}] + \beta_2[\text{RVCF}] + \beta_3[\text{EGF}] + \beta_4[\text{UCF}] + \beta_5[\text{ECF}] + \beta_6[\text{Regional}] + \beta_7[\text{Multiple}] + \beta_8[\text{MSCI}] + \beta_9[\text{InvYear}] + \beta_{10}[\text{Bubble}]$$

The model used in Equations (2), (4), and (6) was

$$[\text{Exit stage}] = \alpha + \beta_1[1995\_Funds] + \beta_2[1998\_Funds] + \beta_3[\text{Regional}] + \beta_4[\text{Multiple}] + \beta_5[\text{MSCI}] + \beta_6[\text{InvYear}] + \beta_7[\text{Bubble}]$$

The results of this analysis are not as strongly significant as the previous formulation; this is likely due to the relatively small sample size of firms from the post-1998 pool that have exited. The small number of exits meant that there were

multicollinearity issues with several post-1998 schemes, including ECF and UCF. Given the limited size of the sample, care must be taken with interpretation of the results.

Several of the results were robust and significant across formulations. There was a slight but significant indication that post-1998 firms were less likely to reach IPO. MBO/MBIs were found to be more likely to exit via trade sale, as might be expected. As expected there were strong results suggesting that early stage firms were significantly more likely to fail than other firms. Less expected was an even greater probability for failure among firms that receive expansion funding. This is an interesting finding that might be linked to the evidence in Nightingale et al (2009) suggesting that firms go through a 'valley of death' of increased mortality after receiving funding as they reconfigure for growth. If we consider that successful exits may take longer periods of time to mature (again the saying 'lemons ripen before peaches' is relevant here) then higher rates of failure might be expected.

**Table 6.7.4 Likelihood of Investments Reaching Exit**

	IPO Exit		Trade Sale		Write-off	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	198.00	165.02	451.85	456.978	413.858	397.057
<i>Type of fund</i>						
VCT	0.004		0.027		0.023	
RVCF	0.005		0.037		0.049	
EGF			-0.025		0.014	
UCF			0.044			
ECF						
Regional	0.015	0.015	0.008	0.009	-0.006	
Multiple						
Funds_95		-0.005		0.028		0.030
Funds_99		-.0007***		0.029		0.029
Funds_06						
<i>Investment type</i>						
Early stage	0.042	0.034*	0.015	0.015	0.070***	0.067***
Expansion	0.042	0.044*	0.024	0.023	0.090***	0.095***
MBO/MBI	0.025	0.025	0.074***	0.074***	0.008	0.010
<i>Market Conditions</i>						
MSCI Investment Year	0.000	0.000	-0.001	-0.013***	0.000	0.000
First Investment Year	-0.001	-0.000	-0.013***	-0.013***	-0.016***	-0.015***
Bubble	0.003	0.003	0.025	0.025	0.022	0.022
<i>Model Diagnostics</i>						
Number of observations	1865	2020	2086	2086	2020	2020
Number observations where dependent variable = 1						
Loglikelihood	-130.658	-132.608	-534.151	-535.640	-608.058	-609.047
Pseudo R <sup>2</sup>	0.0744	0.075	0.1007	0.0981	0.080	0.079
Chi-squared statistic	20.99**	21.43***	119.56***	116.59***	105.99***	104.01***

### *6.8 Research question IV: Differentiation of capabilities in equity investments*

The thesis has previously argued at other points that there are different capabilities that have facilitated different results and different forms of success in the UK VC sector. Measuring and quantifying capabilities is difficult in most circumstances, and is especially difficult in cases such as the VCT sector, which has relatively small groups of investments, which limit the effects sizes. However, some exploratory results can be outlined.

One very interesting element of these data is the performance of technology based investments in table 6.6.1. Examining those investments made in software and computer services and technology hardware and equipment, we see generally positive mean IRRs for investments made from 1995-1998. However after this period returns in these areas fall dramatically. This would provide support to our hypothesis presented in the previous chapter that investments in technology-based investment were largely made by people with knowledge of the sector until the 'boom' period of 1999-2000, when less experienced investors invested heavily in the market and made bad investments that gave negative returns. Whereas other sectors in table 6.6.1 appear to show performance loosely linked to the economy (see construction and materials) or that fluctuates alongside economic conditions (see financial services), the technology based sectors seem to be consistent with this trend.

Further examination of the case of the biotechnology sector provides some interesting insights. The IRR breakdown by year shows one year that yielded positive investments in 1997 followed by three years of very poor performance, followed by mixed performance the years after that. This would support our hypothesis above, however within the details another interesting nuance emerges when we consider listed and unlisted investments. Of the six investments made by VCTs in unquoted biotechnology firms, five were exited for a profit, and only one failed. Of the 35 investments made by VCTs on AIM-listed biotechnology firms, only eight of those investments were exited profitably, while the rest resulted in a

loss or the liquidation of the firm. This suggests that the few VCTs that knew enough about the market to invest in unquoted biotech firms were successful, whereas those that did not understand the market and took a chance on something on AIM were likely to be making poor investments. This would suggest some form of support for a capabilities-based interpretation, and it would suggest there was some form of differentiation within the screening processes based on knowledge and understanding of the sector. This would support the suggested path of development of capabilities for the VC sector proposed in Chapter 5, perhaps suggesting that there are generalist VCs with little technical knowledge other than that of investment evaluation. These non-experts these have been differentiated from the more technically-oriented VCs who have specialist knowledge and, it could be suggested, make more successful investments in early stage technology firms.

## 6.9 *Summary and conclusion*

This chapter has provided an empirical examination of UK publicly-backed equity investments that draws upon the insights generated from the qualitative analysis in Chapter 5. Using a new, hand-collected dataset of all investments made under the Venture Capital Trust scheme, which was then merged with an improved version of the dataset used in Nightingale et al (2009), it tested and found initial empirical support that relates to a series of common themes.

The data suggest that the VCT scheme was used by investors for MBO based investments, and that these investors tended to shun early stage firms. However later schemes such as the RVCF, EGF and others were generally much more successful in addressing these issues. The lack of investment in these areas is hypothesised to reflect a lack of demand for capital, given that the pool of investments receiving capital from the VCT scheme failed to generate one year in which investments had mean positive IRR. The lack of demand is compounded by difficulties in reaching profitable exit. The high failure rates of firms receiving VCT investment is significant, as are the general preference of firms for trade sale exits

over other forms of exit that might be more profitable but are generally riskier. This supports the survey data in Murray (1994). Finally the chapter provides very initial evidence from the VCT sector that provides initial support for the explanation of the development of capabilities in the UK VC sector outlined in Chapter 5.

The following chapter will summarise the empirical chapters and will link the empirical findings in these chapters to the theoretical perspective discussed in Chapter 2. In doing so, it will argue that an evolutionary perspective may provide insights to the data discussed in the thesis that a principal-agent perspective might be unable to provide.

## Chapter 7: Analysis and Conclusion

### 7.1 *Introduction*

The research question for this thesis asks, ‘What has been the historical role of policy in the emergence of the UK and US venture capital sectors? Further, are the stated or implicit framing assumptions behind creation of policy, particularly regarding the principal-agent perspective, reflective the empirical data? And can the evolutionary perspective provide theoretical understanding of the VC sector that a principal-agent view cannot?’. Previous chapters have discussed the cases of the US and UK, with the former providing context for the latter, more detailed case. The previous two chapters provided qualitative and quantitative empirical evidence from the UK, with particular focus on evolution of UK government-backed schemes in providing funds to early stage firms; the quality of the field of potential investments; the nature and quality of exit opportunities; and the potential existence of different capabilities in the UK VCT sector. While the cases and empirical evidence presented in the previous three chapters are interesting, on their own they lack the ability to explain the broader differences in the sectors in the context of the framing of policy, as discussed above.

This chapter therefore answers the research question by contextualising the empirical findings regarding the role of policy in the development of the UK and US VC sectors within the two distinct theoretical perspectives discussed in Chapter 2. It will argue that the principal-agent and evolutionary perspectives both have strengths and weaknesses in explaining the empirical outcomes. However it will suggest that an evolutionary perspective is able to provide a uniquely nuanced perspective on key policy issues that do not emerge under a principal-agent perspective. One weakness of the evolutionary perspective is that it does not immediately point to a clear policy agenda, but this chapter will seek to make initial steps toward an evolutionary theory of policy.

Section 7.1 frames the chapter. Section 7.2 will summarise the empirical discussions of the previous chapters. Section 7.3 will argue that that framing

assumptions of the theory of the firm lead to vastly different interpretations of policy. Section 7.4 will discuss potential means for operationalising evolutionary theory into a policy context. Section 7.5 will discuss initial policy conclusions drawn from the thesis, and Section 7.6 will discuss weaknesses and areas for potential future research. Section 7.7 will conclude by discussing the contributions made by the thesis.

## *7.2 Summary of the thesis*

### **7.2.1 Framing and research question**

This thesis seeks to explore the impact of policy on the emergence of the VC sectors in the UK and US, and the ability of theoretical perspectives to explain these historical cases. The thesis draws upon the principal agent perspective and the evolutionary and capabilities perspective to frame the discussions of history.

The principal-agent approach draws upon the view that all relationships are contracted and the economic system is based upon incentives and their appropriate application. From this perspective the VC sector is characterised by efficient contractual relationships in which the management of principal-agent risk is the basis of the relationship between VCs and the firms they back. This view is relatively simple and powerful, and provides a clear line of argument for policy: in order to build a VC sector any equity gaps must be addressed and principal agent issues must be covered, and if these conditions are met the sector should be allowed to grow unimpeded.

The alternate approach used in the thesis draws upon the evolutionary and capabilities perspective. This approach views capabilities as the basis of firms, and because firms have different capabilities the marketplace is characterised by heterogeneity. In this way competition is driven by firms and industries developing and implementing capabilities enabling them to derive value from their relationships. Therefore networks and institutions will be particularly important as these affect the ability to form and shape relationships. This approach is useful but does not provide a clear line of explanation from a policy perspective.



These theoretical perspectives discussed above are tested in the subsequent empirical work. The thesis adopts the three-relationship framework discussed in Chapter 2 as the general perspective for the analysis of the VC sectors in this thesis. In particular it examines how policies have affected each of the three areas – the VC-firm relationship, LP-GP relationship and firm-IPO/exit market relationship – and have subsequently impacted the development of the US and UK VC sectors. The research design is based around historical examination of elements of these three factors in both the US and UK. Given its success and importance in policy discussions, the US is used as a contrasting case that provides context to the later, more detailed discussion of the relationship of policy to the UK. For the case of the UK, qualitative discussions were then followed with quantitative analysis, using data from the proprietary datasets generated for this thesis.

### **7.2.2 Venture capital in the US**

Chapter 4 discusses the emergence of the US VC sector. It discusses the history of the sector, arguing that the venture capital sector in the US was not a single revolutionary invention but an evolving institution, ultimately including ‘merchant’ as well as ‘classic’ venture capital. VC in the US largely took shape in two regions that were initially characterised by a single-minded ethic to focus on small firms (in Boston) and relative isolation from large financial centres (in Silicon Valley). While the US VC sector is often considered to be a single entity based upon the Silicon Valley model, the chapter suggests that several regional models of VC exist, though this heterogeneity is often not appreciated. In cases where strong VC sectors have emerged, strong networks effects have been present. In line with Kenney and Florida (2000), the chapter argues that these networks, involving entrepreneurs, VCs, universities, and providers of professional services, have subsequently played a key role in driving demand for the services that VCs provide.

The chapter argues that the role of the US government in providing financial support for the VC sector in the US was extensive and crucial. This intervention came not from direct involvement but typically in the form of indirect supply- and

demand-side support for the sector (as in Pavitt 1998). Supply-side schemes such as SBICs and the ERISA policy change typically were indirect in their support, facilitating the growth and professionalization of the industry without directly intervening in investment patterns. Demand-side interventions such as the SBIR and ATP schemes were more direct in awarding funds to firms, but typically targeted firms at relatively earlier stages in their development (Cooper 2003). These demand-side schemes have generally had positive effects in driving the sector, and firms backed by these schemes have a positive track record of success and receiving VC funding (Lerner 1999). At the same time, firms receiving support from VCs generated good returns, thus guaranteeing the continuation of the sector. The ability to generate these returns may be due to several factors (among them the unique legal factors discussed in Section 4.5.1), but perhaps the most important was the NASDAQ market, which gave a means for generating high value exits.

The chapter also presents a capabilities-based explanation of the success of the US VC sector. It suggests that non-dynamic capabilities exist for screening (Macmillan et al 1986) and management of agency risks (Gompers 1995). Adopting an idea from Ed Steinmueller, it also argues that there exist a number of dynamic capabilities, including the ability to extract value from networks (Hochberg et al 2005); learning (See Reiner 1989 p. 384); and economies of scale, both in fund size and exploitation of the growth opportunities for exit via NASDAQ (Ingbretsen 2002). Further it argues for that there is another dynamic capability in the US VC sector based on the assembly of complementary assets. VCs do this by utilising expertise and reputational capital (Megginson and Weiss 1991), syndication (Brander et al 2002), and relationships (Greenwood and Steier 1997), assembling the assets required for a firm to grow to the point where it can be exited. These dynamic capabilities have enabled the sector to grow and succeed in very turbulent market environments.

### **7.2.3 Venture capital in the UK**

Chapter 5 discusses the emergence and development of the VC sector in the UK, arguing that the UK experience with VC and small firm finance has differed

significantly from that of the US. It argues that the UK has been dominated for nearly eighty years by the notion of an 'equity gap', and proposes that the 'equity gap' has become a boundary object that is widely recognised but is interpreted by different actors to have different meanings. The gap has its origins in the identification of the 'Macmillan gap' in 1931, and from that time the UK government was more directly interventionist, particularly in addressing supply-side issues. Institutions such as ICFC (later 3i) were created to fill the gap in funding to small firms. After 1979 the form of policy interventions shifted from government-backed institutions to schemes using tax incentives to leverage private funds to address targeted areas of finance. This approach, beginning with the Business Start-up Scheme and Business Expansion Scheme, and later the Venture Capital Trusts and several others, sought to address the problems faced by small firms as a supply-side issue, addressing a perceived market failure. Throughout this period, despite shifting definitions of what the equity gap is and how it should be addressed, it has remained a mutually agreed issue, even if the precise definition is constructed differently by different actors. This focus on the supply of capital was assumed to be a problem, regardless of whether there was demand for the capital being offered. In the absence of demand from quality investments, increases in the supply of capital, meant to address the equity gap, would instead risk wasting the money on low quality firms, increasing the risk of an adverse selection effect as seen in Amit et al (1997).

The chapter also presents a capabilities-based history of the UK VC sectors. The UK private venture capital sector began in the late 1970s, but has its roots in ICFC/3i, the original small firm funding body. From its early days ICFC had maintained a strict policy against intervening in the firms it backed (Coopey and Clark 1995 p. 210). As a result the organisation's capabilities were oriented around screening potential investments (ibid p. 175). With the emergence of a private VC sector 3i staff left the firm to join new entrants into the VC market, bringing with them their capabilities, which then began to diffuse through the sector. If AR&D seeded the Boston VC sector and investors related to Fairchild and Rock seeded Silicon Valley, so ICFC seeded the UK sector.

Without the philosophical or locational isolation seen in the US VC sector and following some early high-profile failures (Lonsdale 1997 p. 120), the UK VC sector began to shift its focus toward 'merchant' VC deals. The screening and selection capabilities developed at ICFC/3i were particularly useful in identifying these deals, and the new Unlisted Securities Market provided a means of exit.

The economic downturn in the early 1990s slowed the growth of the UK sector, but by the creation of the Venture Capital Trust scheme and the Alternative Investment Market in 1995, the base of capabilities in the UK was considerably narrower than that in the US (see Murray and Marriott 1996, Locket et al 2002). This meant that UK VCs were poorly placed to replicate the results seen in the US when the VC-fuelled dot-com bubble emerged in the late 1990s. The subsequent poor results drove UK pension fund managers (who were already prone to herding behaviour) away from early stage investments. This has been exacerbated by the growth of AIM, which provides capital but does not represent an immediate means to an exit (Khurshed et al 2005). This links to the suggestion in Murray (1995) that the lack of highly profitable exits may be due to a secondary funding gap in the phase of firm growth where firms would otherwise be growing rapidly.

The chapter concludes by summarising key issues identified from this examination: the difficulties of using a supply-side interpretation of small firm finance as a driver of policymaking; the challenges of developing markets for exits from investments in small firms; and the issues around early development of capabilities in the sector.

#### **7.2.4 Success of UK government backed schemes: A quantitative analysis**

Chapter 6 extends the discussion of the UK case via a quantitative analysis of a series of UK government-backed schemes. It uses a proprietary, hand-collected dataset consisting of all investments made under the Venture Capital Trust scheme, as well as another dataset (also used in an earlier form in Nightingale et al 2009) containing investments made under several subsequent schemes. Some parts of the analysis repeat the method used in Cumming (2007), who uses a

formulation of logit regressions to test the effectiveness of a set of funds in achieving particular investment goals.

The chapter examines four research questions drawing from the analysis in Chapter 5: that purely market-oriented supply-side schemes are less successful than more targeted, hybrid schemes in attracting funds to early stage firms; that demand for capital may be an issue in the underperformance of investments; that investment exit opportunities are limited, making the investing in small growth firms less attractive for institutional investors; and that there are variations in capabilities within the VCT market.

The examination of the success of different schemes draws upon a combined formulation of the two datasets to support the historically-derived conclusion that a shift from schemes based on tax-incentivised funds from consumers to 'hybrid' schemes based on public and private funds resulted in greater investment in early stage firms. The findings are robust under different formulations, and suggest that the post-1998 schemes are more likely to invest in early stage and expansion stage capital, and less likely to back MBO and MBI-level investment.

Demand for capital is examined via proxy by considering the performance of the entire pool of investments made by the VCT sector. Given the minimal selection effect present in firms backed by the VCT sector (as in Cowling et al 2008), the fact that the entire pool of investments never had a year with a positive mean IRR of investments suggests that the demand for capital from high quality investments may have been somewhat low, especially if one considers that these aggregate negative IRRs include the more favourable investments including MBOs and expansion capital found to be more prevalent elsewhere in Chapter 6.

Exit patterns in the UK are examined using both descriptive and econometric analysis. It provides new data following on Murray (1994) showing that for both VCTs and the schemes that followed, IPOs remained difficult to obtain and trade sales were the dominant and most reliable form of exit. It also provides data on exit suggesting that firm failure rates among all interventions has been higher for

expansion-stage firms than early stage firms, possibly providing support to the 'valley of death' J-curve seen in Nightingale et al (2009).

Finally the chapter provides initial exploratory evidence from the VCT data that gives some support to the assertion made in the proposed framework for the evolution of capabilities in the UK VC sector in Chapter 5. Drawing upon early stage technology investments it gives initial evidence that suggests specialist VCTs were more able to identify and profit from unquoted, early stage technology investments than generalists, who came to market later and tended to have much larger losses.

These results provide findings, some robust and some more explanatory, that provide some support for the general framework identified in Chapter 5 regarding the case of the UK. Given these findings, the following sections will synthesise these and link the findings to the principal-agent and evolutionary perspectives.

### *7.3 Framing theories and policy: Different interpretations of the case of venture capital*

The research question for this thesis questions not just the role of policy in the emergence of the US and UK VC sectors, but also seeks to understand the different ways in which the principal-agent and evolutionary perspectives address and explain the issues facing VC. This section will answer these issues, and thus fully answer the research question. The section above and chapters before presented empirical evidence of the case of the UK and US, and Chapter 2 outlined the expected differences between the principal-agent and evolutionary perspectives interpretations of VC. This section will compare those expectations with the empirical data generated in the thesis, identifying the strengths and weaknesses of each approach. It will then demonstrate that different theoretical framings lead to very different interpretations of the policy challenges associated with venture capital and small firm finance.

### **7.3.1 The principal-agent perspective on venture capital in the US and UK**

The principal-agent approach is the most commonly used theoretical perspective used for the analysis of the VC sector. It explains all economic activity in terms of contractual relationships, and uses these contractual relationships as the central unit of analysis. This has made it a useful perspective for the academic study of VC, because agency problems are among the most prevalent issues that VCs and entrepreneurs face. This approach therefore is especially useful for addressing most of the main relationships in which VCs engage: specifically with firms in structuring and monitoring deals, and with the institutional investors who provide funding. However, as discussed in Chapter 2 it does not allow for roles for institutions and other economic elements. Because of its focus on contractual issues, the principal-agent view tends to operate on the assumption that if the proper contracting and incentives are in place, a market will therefore operate efficiently. In taking this approach it overlaps with the prevailing view of market failure.

The principal-agent view therefore explains the US as a relatively straightforward case in which markets have worked effectively. From this perspective the US would therefore be judged as a case in which there was an initial market failure (or equity gap) facing small firms. The gap was partially filled by AR&D but that company was not large enough to address the national gap on its own, so the SBIC programme was introduced as a means of incentivising entry into the market. Many VC firms entered the market, providing the supply of capital that firms needed. The ERISA regulations facilitated much more capital being directed to VCs, and the market had growth to be self-sufficient. With efficient contracting and incentives throughout the US political system, the market was ultimately successful.

This may be contrasted to the case of the UK, where this perspective again provides a relatively straightforward interpretation. It would acknowledge the case of the equity gap in the UK as a market failure, interpreting the supply of capital to be insufficient to meet demand. In this case the fault would be perceived

to be either with the supply of capital or demand for capital, and given the assumption that contracting may derive efficient returns, it would be difficult to explain in this framework any lack of demand for capital. (If there were to be such a problem, the answer would be to incentivise firm creation). Consequently the principal-agent view would support a supply-side interpretation of the problem, viewing the equity gap as a real and substantial issue requiring government support.

Consequently the scheme would advocate an incentive-based approach to filling the equity gap, similar to that used in since Conservative government of the 1980s. It would suggest that schemes such as BES and VCT were not successful in addressing the equity gap because they did not provide the proper incentive structures. In order for a scheme to successfully target the equity gap, the incentives would need to be properly aligned to specifically target investment in a certain direction. In this way, as incentives are manipulated and aligned, the sector may be able to grow and succeed.

The empirical analysis presented in this thesis does not present any material that significantly contradicts the principal-agent interpretation of the case of the US. However the case of the UK is considerably more challenging. The perspective embraces the equity gap as a market failure, but there are other results generated within the thesis that this approach is less readily able to explain. The results suggesting that the schemes developed after the VCTs were more successful would, as suggested above, be predicted. The approach would have considerably more difficulty explaining the suggestion that there may be demand-side weakness in the market. Other than inefficient managers or contracting there is relatively little scope in this perspective to explain low levels of firm quality, particularly on a wider scale. Similarly, if efficient markets are to be embraced (as they are in this perspective) the issues of institutional boundaries to exit (such as the absence of IPO markets) would be difficult to square with this view. In a situation where there is perfect information and agents act rationally, these agents would be expected to maximise returns and find optimal prices in whatever form possible; it could be possible to explain these results from this perspective, but it would not be an easy



explanation. The final empirically-backed conclusion from the previous chapters relates to different capabilities; there is little room in the principal-agent view for capabilities. Differences in firm performance can best be explained by differences in contracting, rather than specific characteristics of firms. Indeed it is easy, under such a view, to slide into a reductionist view that adopts the neoclassical view of homogeneity among firms, which provides no room for firm heterogeneity whatsoever.

Despite these, the principal-agent view has a number of significant strengths. It provides a clear and cogent framing of the issues at hand in the VC sector. Its explanation of contracting and agency issues is essential for understanding the nature of the relationships with which VCs engage. It is intellectually coherent, straightforward to understand, and provides a clear framework for addressing and understanding policy issues. Policies in this perspective seek to address an ongoing market failure due to information asymmetries, and the challenge facing policymakers is to develop incentive structures that will direct investment to the intended recipients in the most efficient manner. If the appropriate environment for success is generated, successful markets are expected to grow.

At the same time the approach has a number of significant weaknesses as well. Despite its explanatory powers it is unable to address several empirical phenomena documented in this thesis, meaning that its explanatory power is limited. It also, as suggested above, has the tendency to become overly reductionist, viewing all economic activity through its own lens and reducing the scale of economic activity to a palette easily explicable within its framework. When this happens, it is easy to interpret one perspective, for instance supply-side interpretations of funding issues, to the exclusion of other perspectives. The result can easily be the embracing of a supply-side perspective to the exclusion of a demand-side view. This has the potential to be detrimental to policy in that it may address one aspect of an issue but exclude other issues that could produce a more holistic framing policy.

Ultimately the strengths of the principal-agent approach must be considered in balance with the corresponding weaknesses. In presenting a clear framing of issues it certainly has broad appeal, but its corresponding weaknesses must also be acknowledged when policy frameworks are being considered; specifically that despite the appearance of clearly presented economic rationale, a pure principal-agent or contracting approach may exclude or poorly explain elements of economic activity that can be crucial for economic growth.

### **7.3.2 The evolutionary perspective on venture capital in the US and UK**

While the market failure/principal agent perspective discussed above does maintain explanatory power and usefulness in a policy context, the empirical findings discussed in this thesis suggest that an alternate theoretical orientation may provide a different perspective on the cases of the US and UK. There are several aspects of the development of these VC sectors that are less easily explained by the previous approach but which may provide particularly relevant insights for implicitly framing policy for the UK.

The evolutionary perspective, as discussed in Chapter 2, views firms as being based not on contractual relationships, but instead on knowledge. The activities that define a firm from this perspective are therefore identified as routines or capabilities. These may be suitable for moderately dynamic markets, but Eisenhardt and Martin (2000) argue that for turbulent markets simpler, dynamic capabilities must be present.

From the evolutionary view the case of VC in the US would represent a coevolutionary process involving firms, VCs, and policy. The success of the sector would be attributed to a number of factors. This perspective places specific focus on the role of networks, which have facilitated a very fluid labour market (see Carnoy 2007) and enabled rapid knowledge sharing throughout networks. Further, these networks have been argued to drive demand for capital, providing VCs with a constant stream of high quality investment opportunities (Kenney and

Florida 2000). At the same time participation in networks allows entrepreneurs to access both VCs, and knowledge of what VCs seed in firms (ibid).

In addition to this demand for capital, the evolutionary perspective would interpret much of the success of the US VC sector to the development of a set of dynamic capabilities that allow VCs to navigate rapidly changing market environments. These dynamic capabilities have allowed VCs to extract value from networks (Hochberg et al 2005), learn (see Reiner 1989 p. 363-4), and exploit economies of scale, both in fund size and in the domestic markets of the US. Arguably the most crucial is the dynamic capability of assembling complementary assets into firms that can then be taken to IPO, as suggested by Ed Steinmueller (personal communication).

The success of the US VC sector would also be attributed to unique institutional structures for exit and investment that have facilitated growth of the sector. The NASDAQ market has played a key role in providing VCs with a means of exit from their investments (Ingebretsen 2002), but its success has also been driven by the possibilities for economies of scale present in the US economy, as well as the unique institutional features of the federal system (see Bush 2005). Beyond this, heavy spending by the US government on the military and higher education systems (see Dosi et al 2005, Galbraith 2007) has generated circumstances in which the results of government investment may be readily appropriated for private gain. This serves to drive both demand for VC (by bringing innovations with market potential) and supply of capital (by driving exits, which increase returns and make VC a favourable investment).

In this way the success of the US may be interpreted as a complex, unique confluence of circumstances that coevolved in a manner that allowed the US VC sector to grow and become very successful. A similarly path-dependent coevolutionary process has been observed in the UK as well, also including firms, VCs and policy. However the emergence of the UK VC sector, as interpreted by the evolutionary view, is quite different in its outcome.

As argued in Chapter 5, the 'equity gap' has become a boundary object that has in many ways focused policy attention on supply-side issues in the UK, rather than demand-side issues. Without the strong networks driving demand as seen in the US VC sector (see Kenney and Florida 2000), there has not been a constant stream of demand for capital. Some network effects have developed in the UK, particularly in Cambridge and Oxford (see Keeble et al 1998, Cooke 2001), but the demand derived from them for the VC sector is relatively unclear. However anecdotal (Guthrie 2007 describes RVCs unable to find quality investments) and empirical (see Nightingale et al 2009) evidence suggest that there are weaknesses in the demand for capital from firms. This assertion is tentatively supported by the findings in Chapter 6, which were initially derived from the historical analysis. By finding that the entire pool of investments made by the VCT scheme was generally of poor quality, it suggests that purely supply-side oriented policy may not be adequate for addressing the challenges of the sector.

The emergence and shape of the VC sector in the UK would also be interpreted to have been significantly informed by the capabilities displayed by the VC sector in the UK. The embeddedness and path dependence of capabilities would support the assertion in Chapter 5 that the sector was shaped by the initial capabilities developed at ICFC. These capabilities would have not been dynamic capabilities, reflecting the moderately dynamic environment seen in ICFC at the time. Without the ability to adjust to dynamic markets, the non-dynamic capabilities were found to be more successful in the MBO sector, while the VC sector was divided between specialists and some generalists. This assertion was also tentatively supported by the empirical findings in Chapter 6, which suggested that different sets of capabilities had emerged, with some more technically-specific (and likely more dynamic) than others, which were more similar to the capabilities seen elsewhere.

Finally the environment for exits has played a significant role in the underperformance of the VC sector. Without the means for generating returns from overvalued IPOs, as has happened in the US with NASDAQ, the sector has been unable to generate the returns seen in the US, discouraging institutional investors from backing the sector. This assertion, suggested in Chapter 5, was

supported empirically in Chapter 6, which showed that VCs are more likely to seek exit via trade sale than any other means, even though it generates lower levels of return than other forms of exit.

These broadly evolutionary perspectives draw out nuances of the nature of the venture capital sector that are not immediately explained by the principal agent perspective. They similarly provide an explanation of the emergence and dynamics of the US VC sector, but also identify some significant differences between the US and UK that the other approach does not consider. They also provide a more holistic perspective, accounting for issues of firm heterogeneity by encouraging firms to develop capabilities that will make them good investments from the perspective of investors, thus avoiding adverse selection scenarios. This perspective seeks to address issues of supply and demand, with an aim toward developing a successful ecosystem for firm financing and growth<sup>37</sup>.

The approach does have theoretical and policy weaknesses. From a theoretical perspective the evolutionary and capabilities view is very useful in explaining the emergence of industries and issues of competitiveness. However, the perspective essentially lacks a role for incentives (see Dosi and Marengo 2007), which makes the actual targeted design of policy particularly difficult. Consequently, the evolutionary approach is only unable to explain the difference in performance between VCTs and later schemes. If one is only able to explain economic activity in terms of capabilities, there is no scope for incentive or agency issues, which remain very real concerns for firms even if they are not able to explain every aspect of the activity of VCs. In this way the evolutionary perspective is useful in explaining aspects of the VC sector, but does not offer a fully developed means to completely inform theory and policy.

Consequently, while an evolutionary perspective may explain new nuances behind policy phenomena that a market principal agent perspective may not, this does not mean that an evolutionary view can (or should) supersede any one perspective.

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<sup>37</sup> This is preferable to having policies that inadvertently create entire sectors that then collapse when a government scheme ends, as happened at end of the Business Expansion Scheme (see Cole 1993 p. 30).

Instead it would seem that the most appropriate approach would be for a variety of theoretical 'lenses' to be used when considering complicated problems with historical and institutional antecedents. Although the principal agency approach may provide useful insights about the nature of the VC sector that is well suited to addressing policy issues, an evolutionary perspective provides a complementary approach that also particularly relevant.

This section has framed the cases in the thesis in terms of the principal agent and evolutionary theories of the firm. It has argued that while the evolutionary perspective provides useful explanations and nuances into the nature of the VC sector, it is weakened by the inability to fully frame policy issues. The next section will propose one way that might be able to bridge this gap, moving closer to an evolutionary perspective on policy.

#### *7.4 Gerschenkron and the role of comparative history in policymaking: Toward an evolutionary theory of policy*

The previous section argued that different theoretical perspectives produce different interpretations of policy, and that an evolutionary perspective provides an explanation of the differences in the US and UK VC sectors that is more nuanced than that of the principal agent view. However the main flaw of the evolutionary perspective in this context is its weaknesses in addressing policy. It is useful for explaining phenomena, but has historically been more limited in generating more normative policy guidance. This is due to two factors; first, as discussed in the previous section, the evolutionary perspective does not have the capacity to address incentives. Actors are assumed to work toward weakly common goals, but there is little role for governance in the perspective. This is an area for future research (see Dosi and Coriat 2001), as discussed in Section 7.6. However the other area of weakness is somewhat more broad, and similarly challenging. The evolutionary perspective places great importance on issues of path dependence and institutions. Historical factors are interpreted to be crucial, and institutions are similarly considered to matter significantly. However whilst the evolutionary perspective is useful for explaining situations *ex post*, it is less useful when actually

seeking to generate policy recommendations. It is easy to criticise policymakers for ignoring historical and institutional factors, but the evolutionary view is itself unable to generate a forward-looking set of policy recommendations; when asked for policy recommendations, a purely evolutionary theorist will only be able to suggest considering these contextual factors (see Bryant 2001 p. 374, also Dosi and Coriat 2001). This has been a significant challenge to the success of the evolutionary view as a useful economic perspective.

This section seeks to address that by drawing upon the writings of Alexander Gerschenkron. In his work (see Gerschenkron 1962, 1965, 1968), he explored the nature of industrialisation largely from the perspective of Eastern European nations in their move from “backwardness” to industrialisation. He argued that European industrial development was not “a series of mere repetitions of the ‘first’ industrialisation but... an orderly system of graduated deviations from that industrialisation” (Gerschenkron 1962 p. 44). In other words, there was not ‘one’ single way to industrialise, but there were many paths to industrialisation, which became more different the greater the length of time from the original event. His work has obvious overlaps with the topic of this thesis (chief among them the notion of graduated deviation, which has potential to be applied to areas such as VC, although this is again an area for future research), but these direct issues of comparison are not directly relevant in this context.

Indeed, Gerschenkron’s work is particularly interesting in this context not because of his particular theories, but indeed because of the intellectual foundations of his work. Much of Gerschenkron’s writing prefigured later work that would follow on path-dependence and capabilities, and this section seeks to argue that these proto-evolutionary views may provide the means that will allow initial steps toward generating a systematic approach to generating evolutionary theory-based policy conclusions.

#### **7.4.1 Gerschenkronian levels of abstraction as a tool for evolutionary policy**

Gerschenkron takes as his approach to history a thoroughly realist perspective. His approach to history and its interpretation focuses on the depth of historical

experience<sup>38</sup> and rejects generalisations (see Gerschenkron 1968 p. 41). At the same time he advocates maintaining flexibility in the level and scale of historical analysis (ibid p. 42) to suit the requirements of the question being examined. This expressed approach is largely common to that of the evolutionary perspective, which similarly has sought to maintain a thoroughly realist (Nightingale 2008 p. 546) and flexible (Dosi and Marengo 2007 p. 493) approach to economic problems.

At a similarly fundamental level there are commonalities between the processes at work between agents within the Gerschenkronian and evolutionary frameworks. Gerschenkron describes the process of industrialisation as a fundamentally unclear process:

“There is no intention to suggest that backward [non-industrialised] countries necessarily engaged in deliberate acts of ‘substitution’ for something that had been in evidence in more advanced countries. Men in a less developed country may have simply groped for and found solutions that were consonant with the existing conditions of backwardness.” (Gerschenkron 1962 p. 359).

There is a striking similarity between the language employed here and Nelson and Winter’s (1982) discussion of the core process of economic search (which they characterise as ‘groping’ (p. 132). Further, Nelson and Winter’s discussion of the role of institutional development displays common sentiments to those of Gerschenkron:

“... the process of institutional development is an evolutionary process, both linked and akin to the process of evolution of firms and industries. It is a groping incremental process, in which the conditions of each day arise from the actual circumstances of the preceding day and in which uncertainty abounds.” (Nelson and Winter 1982 p. 404).

In this way both Gerschenkron and Nelson and Winter (and subsequent evolutionary theory) draw upon the uncertainty behind the actions of economic actors in institutional circumstances. Gerschenkron’s approach points to the substitutability of national factors, but implies that actors, whilst acting within

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<sup>38</sup> Gerschenkron himself was said to refuse to write about a nation unless he could speak its language; by the end of his life he spoke more than two dozen languages (Dawidoff 2002).



their means, are operating in a boundedly rational way, constrained by the institutions of which they are a part.

The significance behind this common framework between Gerschenkron and evolutionary factors lies in its applicability. Gerschenkron's insights on the role of institutions provide us with an understanding of evolutionary implications for policy. His discussion of the substitutability of institutional functions leads us to move beyond the simplistic assumption that 'institutions matter'. Instead his approach leads us to analyse the functional role of institutions in the past in a realist historical sense as a means by which to draw out policy conclusions. This, he suggests, is not easy; it relies on balancing economic predictabilities whilst realising the limitations of predictions, and not confusing either with prophesying (Gerschenkron 1962 p. 359). Further, he suggests, we must be careful in our process of using abstract concepts, using a 'sliding scale' of abstractions (ibid 1968 p. 42) to identify the purpose or function that a certain institution played in a given economy. This may lead us toward a link that could more explicitly generate an evolutionary theory of policy.

If our intent is to identify key functional roles from historical experience, we may be able to understand some of these roles in light of the capabilities literature. If we seek to understand the crucial functional roles that institutions have played across units of analysis with an eye toward replicating those functions in a different location, drawing upon a realist interpretation of capabilities (particularly dynamic capabilities) may allow us to identify these functional roles. The process of identifying these capabilities, and the level on which they operate (i.e. firm, sector, nation) leads us to a clearer understanding of the functional role they serve. For instance in Chapter 4 we argued that there exists a dynamic capability for extraction of value from networks. The empirical identification of extraction of value from networks as being a dynamic capability, and the identification of the role that this particular dynamic capability has played (i.e. using networks to gather and share information and take advantage of fluid labour markets) identifies a functional role (in this case the importance of networks as

means of sharing information and driving demand) that can be operationalised into policy.

This represents an initial step toward developing what could be a potentially quite promising policy synthesis that could draw upon the theoretical strength of the evolutionary perspective and the unusual (and at points oblique) policy perspectives of Gerschenkron. These initial steps have great promise, and would certainly bear further exploration in the future. In light of this the following section will present policy implications that draw upon the empirical conclusions drawn from Chapter 6.

## *7.5 Policy implications*

This thesis has sought to examine the role of policy in the emergence of venture capital, and therefore it is natural to seek to extend the empirical conclusions generated within the thesis to make policy recommendations. This section seeks to provide initial policy conclusions drawing upon the empirical findings, synthesising them in the UK policy context.

### **7.5.1 Capabilities and incentives in policy design**

One of the main empirical findings of the thesis was evidence supporting the assertion that early stage firms were less like to receive funding from VCTs than from later, more targeted policy measures. This was suggested to be related to the loose regulations around investments made under the VCT scheme, which were tightened for subsequent schemes. This speaks to the importance of incentives and policy design. Chapter 5 discussed the creation of the VCT scheme, which was a compromise between a smaller proposed scheme that was narrowly focused, and larger proposed scheme that would include larger investments. In taking a middle path that allowed significant consumer tax incentives, much of the benefit of the scheme to small firms would seem to have been lost.

In this way incentives should be considered to be particularly important for policy design. The shift from purely incentive-based schemes to hybrid public-private

approaches that modify investors' risk reward ratio is encouraging. However another aspect of policy design may be considered in the context of the discussion of the different capabilities seen in the UK VC sector. The BES and VCT schemes encouraged the proliferation of skills focusing around small cap investments without explicitly addressing capabilities for investing in early stage firms. This speaks to the importance of designing policies that encourage the development and propagation of the capabilities seen as being desired.

This is in line with Moss's (2002) discussion of the role of government as a holder and arbiter of risk; policies must be carefully designed to utilise the government's role as rule-maker. Because the government sets the rules, the consequences of these rules must be considered. For the case of technology firms, the VCT scheme saw generally low levels of investment in technology-based firms (apart from some ICT sectors). Had the recommendations of the Williams Report of 1998, which called for a tax exemption of 40% for VCTs focusing on technology and 20% for all other investments, been accepted, significantly more funds would have been directed toward UK high tech firms. This could likely have led to other problems (either adverse selection or the emergence of a bottleneck at higher levels of funding (Murray 1994)), but the implication remains clear: the design of policy is key.

### **7.5.2 Policy design for demand, profit and exit opportunities**

The empirical findings of the thesis also point to two separate but related issues. On one hand, there is the suggestion that there is a lack of demand for capital from high-quality firms. At the same time there is a lack of opportunities for high-value exits, which makes the UK VC sector less attractive to potential institutional investors. These issues in some way represent a chicken-egg situation, in that one can suggest that if there were more high-quality firms then exit opportunities would emerge, whilst it could also be argued that if there were more exit opportunities, there would be more high quality firms emerging as potential entrepreneurs would recognise the opportunity for generating wealth. Both issues are important, and both require policy attention.

There is a significant case for aiming to support firm growth rather than new firm formation. UK policy has largely oscillated between these two approaches, although the prior has generally been the focus most often. Policy approaches providing support to early stage firms have largely taken the form of capacity building and business support, such as with the Business Links scheme. Additional targeted support for small firms to help them get to a point where they are 'ready' for investment and rapid growth is an area for increased policy attention, perhaps taking the 'investment readiness' platform and extending it.

The results with regard to exit show that IPOs whilst very profitable, are not common, leading investors to drive firms toward trade sale exits or management buy-outs rather than IPO. This may be identified as being problematic in two ways: first, this suggests that promising small firms may be purchased by those firms that they might have grown to rival had they been given more time, depriving the UK economy of a new 'generation' of firms (see Nightingale et al 2009). Second, this partially explains some of the weaknesses of the sector; investors will not willingly make poor investments, and therefore avoid VC. If returns will be generated by trade sales instead of IPOs, there seems to be little point in investing in such risky ventures when market index funds might produce similar returns.

Therefore the issue is to build and develop exit opportunities for small firms and their investors. Recent hybrid schemes have been designed on the basis of 'priming the pump' to demonstrate to investors that investing in the equity gap can be profitable (Mason and Harrison 2001 p. 664). The results generated in this thesis suggest that the very high returns that would be needed to make this demonstration would likely only be made by IPOs, which are unlikely. Similarly, this perspective is also aided by the adoption of hybrid funds in that the risk-reward profile of the two schemes is suitably modified to make otherwise less-desirable investments more palatable to the institutional investors who drive the sector. This represents a degree of maturity of perspective by acknowledging that returns are likely not to be able to match those of other alternative asset sectors such as MBOs. Instead it seeks to make investments in VC prove to be profitable in

spite of the riskiness of the ventures. This is another forward step in the evolution of policy understanding of the issues discussed in the thesis.

### *7.6 Limitations and potential for future research*

This thesis has attempted to address an immensely complicated series of historical, institutional and economic issues surrounding the provision of finance to small firms. Given space, time and logistical constraints it would be difficult to present a complete portrait of two national VC sectors, so this thesis has attempted to provide a theoretically-informed overview of the development of the venture capital sectors of the UK and US. There are several areas of this thesis that have significant potential for expansion and further exploration.

Given the scale of the topics covered, the discussions of the histories of the VC sectors in the US and UK have been relatively brief and have left room for significant additional work. There is considerable potential for additional work in these areas, particularly in terms of more explicitly capabilities-focused histories, possibly expanding of some of the Gerschenkronian perspectives discussed at the end. This is an area of significant historical and policy relevance that could provide useful insights into the emergence and role of VC, especially in the UK. More broadly, the discussions of the history of the UK VC sector have the potential to be significantly expanded, in particular the history and politics of the creation and success of AIM. In light of the failure of similar markets of its generation such as EASDAQ and Neur Markt, AIM's success (and yet failure to generate a thriving high tech IPO market) is a rich topic for future study with ongoing policy implications for the European new issues markets.

The capabilities-based perspective of VC advanced in this thesis is an intriguing proposition but has significant potential to be expanded and supported with original empirical data. Attempting to quantify dynamic capabilities and complementary assets is perhaps a questionable strategy, given the documented methodological challenges surrounding both topics, even accepting Eisenhardt and Martin's (2000) realist view of dynamic capabilities. However the academic study

of VC as a field has suffered from something of a paucity of materials generated from case study methodologies (see Steier and Greenwood 1995 for a discussion of VC-firm relationships and Mason and Harrison 2004 on one Scottish government-backed fund). As such, dynamic capabilities and assembly of complementary assets might be useful theoretical frameworks to explore using case study methodology.

The datasets used in this thesis have enormous potential for further exploitation. The cut of the VCT data used in this analysis looked at firms at the unit of analysis, but the data were originally collected at the investment unit of analysis. In order to match the 1999/2006 dataset (which was only available with firms as units of analysis) the VCT dataset was converted to match this. However there are a range of interesting topics that this dataset may help explore, particularly in terms of investment valuation and the role of fund managers and boards. These VCT data are original and give a unique lens into the emergence and dynamics of an entire sector. The 1999/2006 dataset has potential for exploitation as well. It has already been used to generate the results in NESTA/BVCA (2009) but has potential for expansion to include other variables and econometric techniques.

Finally, one area of particular research interest in the future concerns the theory of the firm and the nature of the VCT dataset. Dosi and Marengo (2007) frame the contrast between neoclassical and evolutionary economics in terms of the differences between incentives and capabilities under a bounded rationality framework. One criticism of evolutionary theory is that it does not provide a means for considering incentives and governance in terms of capabilities. Coriat and Dosi (1999) and Dosi et al (2003) have tentatively addressed this issue, seeking to bridge the evolutionary and capabilities literatures with the incentives-based neoclassical literature. Similar links between evolutionary and institutional perspectives have been made by Nelson (2004).

There may be a means for bridging some of this divide empirically in the VCT dataset. Chapter 5 hinted that there might have been specific compliance capabilities developed in the UK BES and VCT sectors as fund managers seek to make conservative investments yet stay within the bounds of regulation. The VCT

dataset, with its exhaustive data on all investments, could provide data that could show investment patterns and possibly support the evolution of these capabilities. Government regulations changed as policymakers attempting to clamp down on investments outside the realm of the intended schemes, providing an element of dynamism. Although further investigation is required, this may be a case that could serve to bridge the two literatures, and begin introducing an incentive element to the evolutionary literature, which would be crucial for the development of a truly evolutionary theory of policy.

### *7.7 Contributions and conclusion*

This thesis has made several contributions to the academic literature. It has made empirical contributions in the form of the new hand-collected VCT dataset, which has potential for significant exploitation beyond the data presented here. The thesis also provides new data about the relative success of the VCT and post-1998 schemes in directing funds to early stage firms, showing that schemes introduced after the 1998 White Paper were much more likely to back small firms and less likely to support MBOs. It also provides new empirical data on exit patterns of VCTs, presenting data that supports Murray's (1995) original data on the prevalence of trade sales, as well as Nightingale et al's (2009) suggestion of a J-curve 'valley of death' pattern of firm survival for early stage firms in the UK. In addition to these it also presents a history of UK small firm policy to the present period, which is useful as the most relevant histories of the UK VC sector (Coopey and Clark 1995 and Lonsdale 1997) extend up to the early 1990s.

The thesis also makes a number of theoretical contributions. It argues that while the prevalent principal-agent theory does have explanatory power, there are numerous nuances of the historical experiences of the US and UK that may be better explained using an evolutionary and capabilities perspective. It presents capabilities-oriented histories of the US and UK VC sectors, arguing that the US VC sector has developed dynamic capabilities for assembling complementary assets into high growth firms that may then IPO. At the same time the UK has developed and encouraged static routines based around screening and managing agency risk.

The thesis has then argued that an evolutionary and capabilities interpretation would identify networks, capabilities and institutions as factors that were key to the US success in VC that are more suitably explained in this perspective than a principal-agent approach. In this way one contribution is the introduction and initial steps toward an evolutionary explanation of venture capital performance in national contexts.

Further, the thesis makes an additional contribution by linking the evolutionary literature to the writings of Gerschenkron, arguing that Gerschenkron shares the same base foundations of the evolutionary perspective (particularly Nelson and Winter 1982) and that a Gerschenkronian 'sliding scales of abstraction' approach may provide a useful means of mapping policy implications of capabilities and functional roles of institutions, creating initial paths toward establishing an evolutionary theory of policy.

In concluding, this thesis has demonstrated that, far from being a single ideal form of supporting innovation, venture capital's evolution as a sector has represented a coevolution of policy, VC, firms and networks. Its success in the US was reflective of extensive networks, dynamic capabilities and institutions. In order for the UK to continue to develop its VC sector it will need to focus on supporting institution- and historically-sensitive policies that drive demand and build the capabilities that will allow the UK VC sector sustain itself and thrive. Recent policy developments have shown promise in moving toward this direction, although there is still more work to be done.



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